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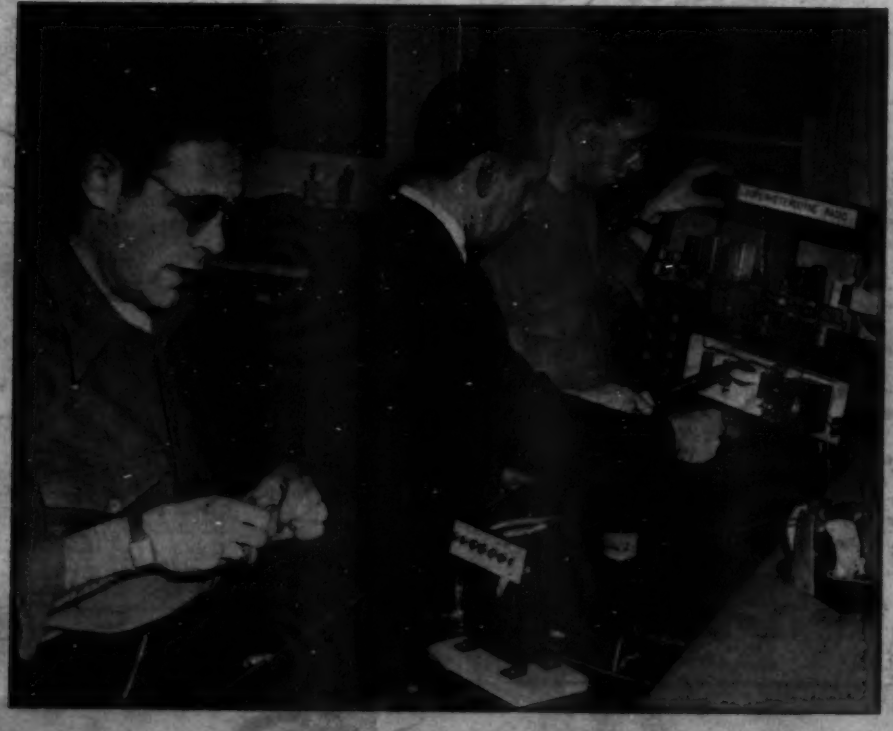
APRIL, 1951 Vol. 40, No. 4

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

The Shop Teachers' Professional Magazine



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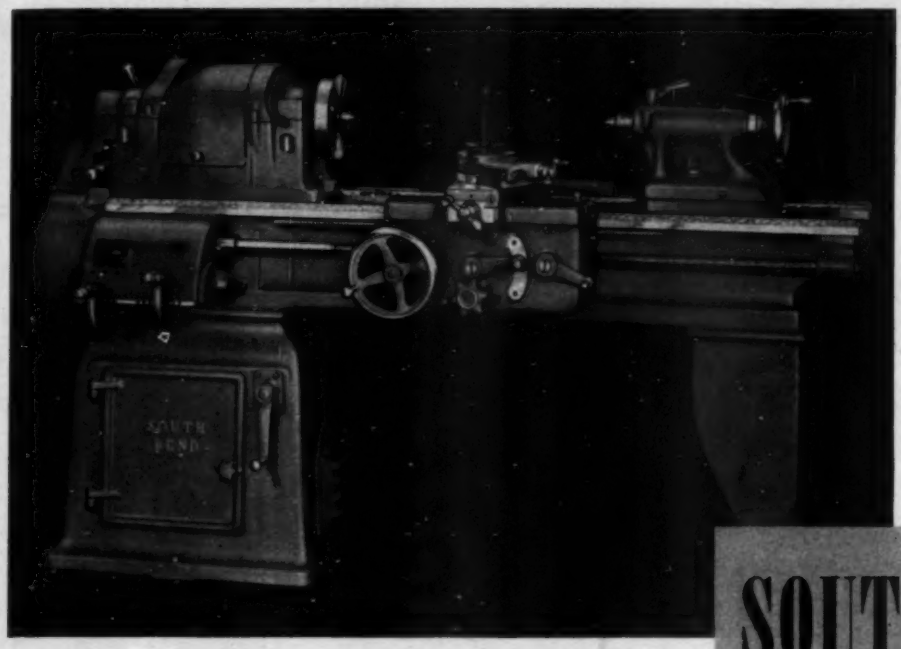

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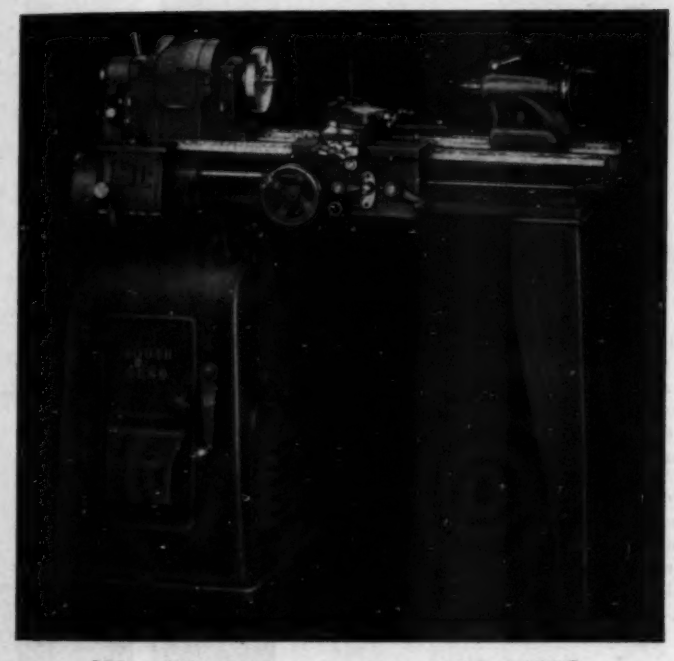

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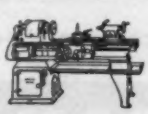

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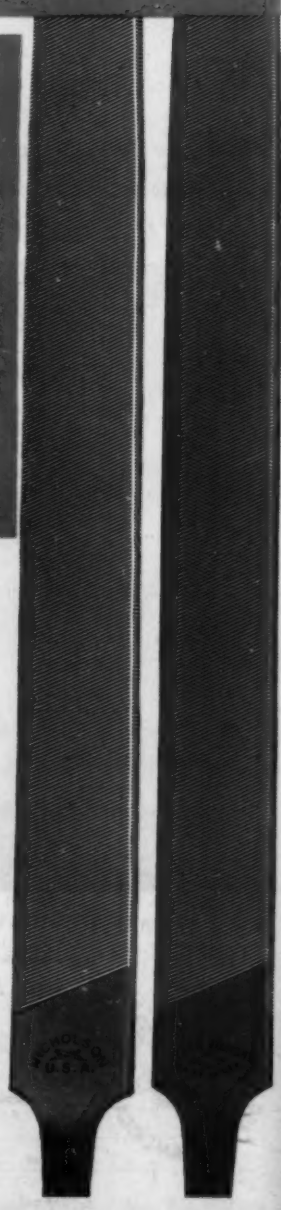

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Vol. 40 No. 4

APRIL, 1951

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

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★ ★ ★ ★

This Month's Cover

The photograph for the cover of the April, 1951, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION was submitted by William A. Bakamis and William A. Kavanaugh, industrial-arts instructors at the State College of Washington, Pullman, Wash.

The picture shows the electrical shop at State College in which elementary electricity and radio are taught. The latter subject is taught on an individual basis.

★ ★ ★ ★

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Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for upon publication. In all cases manuscripts should be accompanied by full return postage.

Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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ASSOCIATION NEWS

Coming Conventions

Mar. 26. **New York State Vocational and Practical Arts,** at Rochester, N. Y. Secretary: W. T. Hudtwalker, N. Y. Board of Education, 110 Livingston St., Brooklyn, N. Y.

Mar. 26–29. **National Vocational Guidance Association, Inc.,** at Stevens Hotel, Chicago, Ill. Secretary: Campbell B. Beard, 1424–16 St. N.W., Washington, D. C.

Mar. 29–31. **Indiana Industrial Education Association,** at French Lick Hotel, French Lick, Ind. Secretary: H. G. McComb, 215 State House, Indianapolis, Ind.

Apr. 5–7. **Illinois Vocational Association,** at Pere Marquette Hotel, Peoria, Ill. Secretary: H. Erwin, Mattson, Ill.

Apr. 12–14. **New York State Industrial Arts Association,** at Powers Hotel, Rochester, N. Y. Secretary: Reno S. Knause, N. Y. State College for Teachers, Albany, N. Y.

Apr. 13–14. **California Industrial Education Association,** at Lafayette Hotel, Long Beach, Calif. Secretary: Lee D. Bodkin, 131 Education Bldg., UCLA, Los Angeles, Calif.

Apr. 19–21. **Michigan Industrial Education Association,** at Civic Auditorium, Grand Rapids, Mich. Secretary, Maurice C. Overholt, 316 S. Fifth St., Grand Haven, Mich.

Apr. 20–21. **Missouri Industrial Education Association,** at University of Missouri, Columbia, Mo. Secretary: M. Stewart, State Department of Education, Jefferson City, Mo.

Apr. 27. **Michigan Vocational Association,** at Union Memorial, University of Michigan, Ann Arbor, Mich. Secretary: F. Donald Manz, Lansing, Mich.

May 2–5. **American Industrial Arts Association,** at Hotel New Yorker, New York City. Secretary: D. A. Bricker, Cincinnati, Ohio.

May 3–5. **Wisconsin Association for Vocational and Adult Education,** at Hotel Schroeder, Milwaukee, Wis. Secretary: C. D. Rejahl, Commercial State Bank Bldg., Madison, Wis.

May 31–June 1 and 2. **Nebraska Vocational Agricultural Association,** at Scottsbluff, Neb. Secretary: R. O. Ginger.

AIAA CONVENTION

The American Industrial Arts Association convention will be held on May 2, 3, 4, and 5, in New York. Headquarters will be in the Hotel New Yorker.

Officers of this organization are: president, Dr. DeWitt Hunt, head, school of industrial arts education and engineering shopwork, Oklahoma A. & M. College, Stillwater, Okla.; vice-president, J. Lyman Goldsmith, supervisor of industrial arts, Los Angeles City Schools, Los Angeles, Calif.; secretary-treasurer, D. Arthur Bricker, supervisor of industrial arts, Cincinnati Public Schools, Cincinnati, Ohio.

The second annual meeting of the American Council of Industrial Arts Teacher Education has been scheduled for Wednesday, May 2, at 9:30 a.m. All college faculty members engaged in Industrial Arts Teacher Education are invited to attend. The first yearbook of the newly organized council will be presented.

An organization meeting has been called for the American Association of Industrial Arts Supervisors for Wednesday, May 2, at 9:30 a.m. All persons with full-time or part-time responsibility for supervising industrial-arts programs on city, county, or state levels are invited to this meeting.

General sessions and group meetings have been scheduled for all day Thursday, Friday, and until Saturday noon. The annual dinner will be scheduled for Friday evening, to be followed by the Ship's Program.

TEXAS VOCATIONAL ASSOCIATION CONVENTION

The Texas Vocational Association will hold its annual spring convention in Dallas on April 5, 6, and 7.

Besides the inspiring program that has been arranged, there will be commercial and school exhibits.

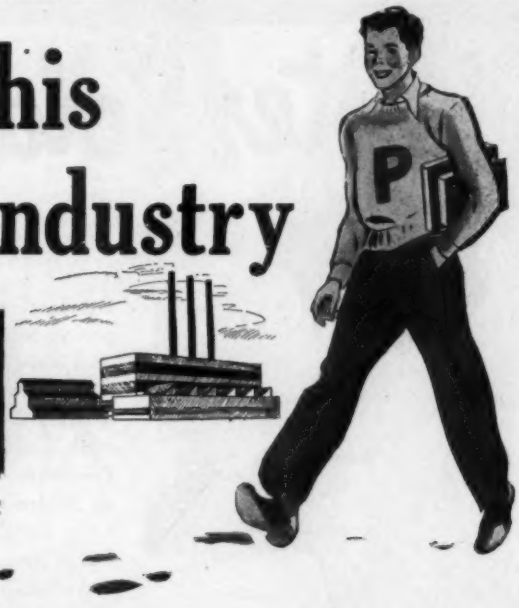
Registration will open Friday, April 6, at 8:00 a.m. The convention will be held at the Adolphus and Baker Hotels.

(Continued on page 6A)

Arts and crafts products made by students of Tucson Senior High School, Tucson, Ariz. Submitted by Harry A. Goldstein, instructor of photography

— Photograph by Billie Harris and Mary Pfrimmer

Train him for his place in industry



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ASSOCIATION NEWS

(Continued from page 4A)

LONG ISLAND INDUSTRIAL ARTS AND VOCATIONAL TEACHERS MEET

The Long Island Industrial Arts and Vocational Teachers Association's annual Industrial Exposition will be held on Friday and Saturday, April 13 and 14, at Caulkins Gymnasium, Hofstra College, Hempstead, N. Y.

Over fifty schools in Nassau and Suffolk Counties are expected to exhibit some 3500 student projects in industrial arts, vocational and technical divisions. Projects in auto mechanics, agriculture, building construction and architectural drawing, mechanical drawing, ceramics, weaving, leathercraft, metalcraft, woodworking, electricity, radio, aeronautics, printing, plastics, machine shop, jewelry, and many other fields will be displayed on the main floor of the gym. Industrials will display on the outer perimeter of the main floor and commercial exhibitors will use one of the large anterooms for displaying their wares.

An innovation of this year's industrial exposition will be live working exhibits operated by students.

Student bands, glee clubs, and musical organizations will provide entertainment throughout the exposition. WSHS, Sewanhaka High School's FM radio station, will again broadcast special events with student engineers at the controls. Winners of the top awards will be interviewed by industrialists on special broadcasts.

State Department officials and college professors will assist prominent industrialists in judging the student projects. Projects will be classified on three levels, elementary, junior high school, and senior high school divisions with a "best in show" award for each division topping the hundreds of awards to be presented.

Dozens of door prizes donated by commercial exhibitors and U. S. Savings Bonds presented by the Long Island Industrial Arts and Vocational Teachers Association will be awarded each day to the public. Admission is free to students and the public.

SPRING MEETING OF SOUTHEASTERN WISCONSIN INDUSTRIAL ARTS CONFERENCE

The Southeastern Wisconsin Industrial Arts Conference will hold its 1951 Spring Session at the Norris Farm School for boys near Mukwonago, Wis., on Saturday, April 7. The program will consist of a speaker, panel discussions, a dinner served in the Farm School dining hall, and movies and visitation tours of the Norris Farm and Foundation grounds and buildings.

—Fred Short.

OSWEGO SPRING CONFERENCE

The 13th Annual Spring Conference at the State University of New York Teachers College at Oswego, will be held on Thursday and Friday, April 26 and 27. The conference will be highlighted by addresses from Dr. Kenneth F. Perry, chairman of the division of the arts at Colorado State College of Education, Greeley, Colo.

Dr. Perry will deliver the main address at the Friday morning general session on the subject, "We Approach Understanding." He will also be the main speaker at the Epsilon Pi Tau banquet on Thursday evening at the Hotel Pontiac, at which time he will speak on the subject, "Your Job and Mine."

(Continued on page 16A)

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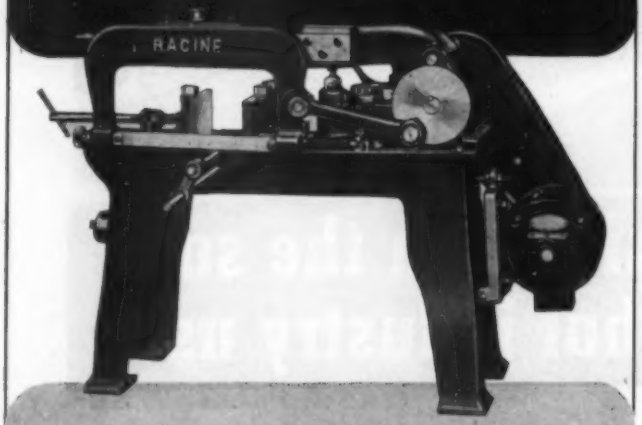

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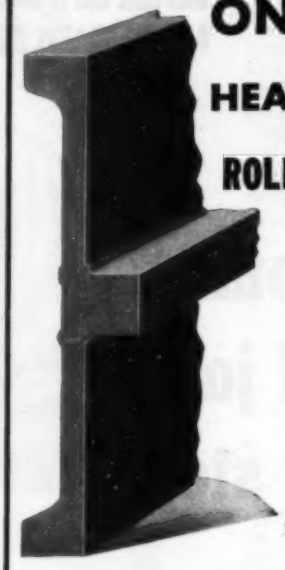

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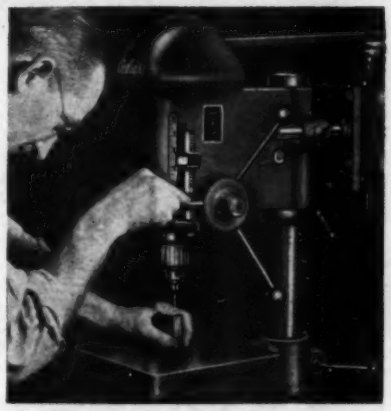

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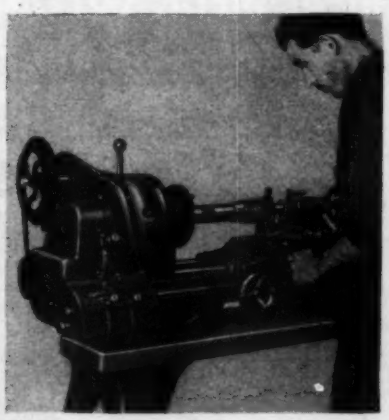

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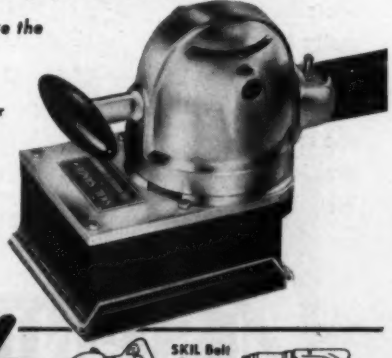

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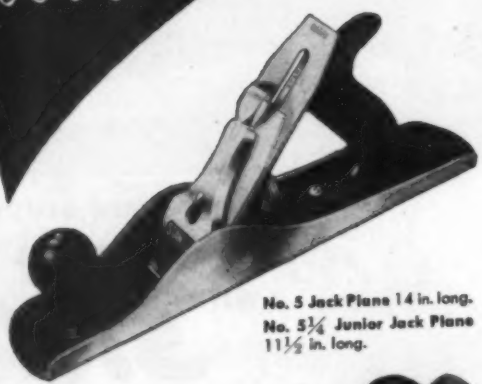

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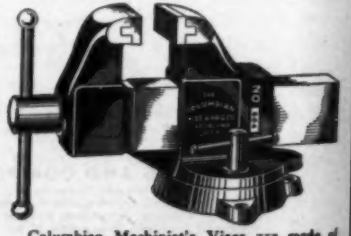

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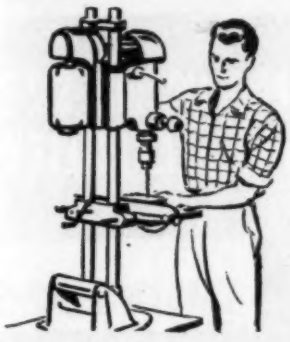

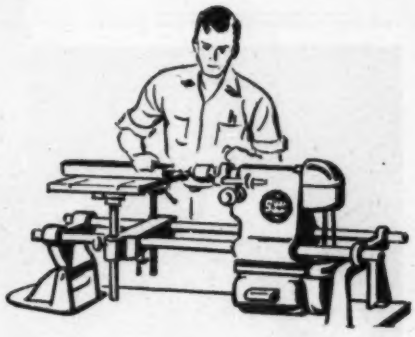

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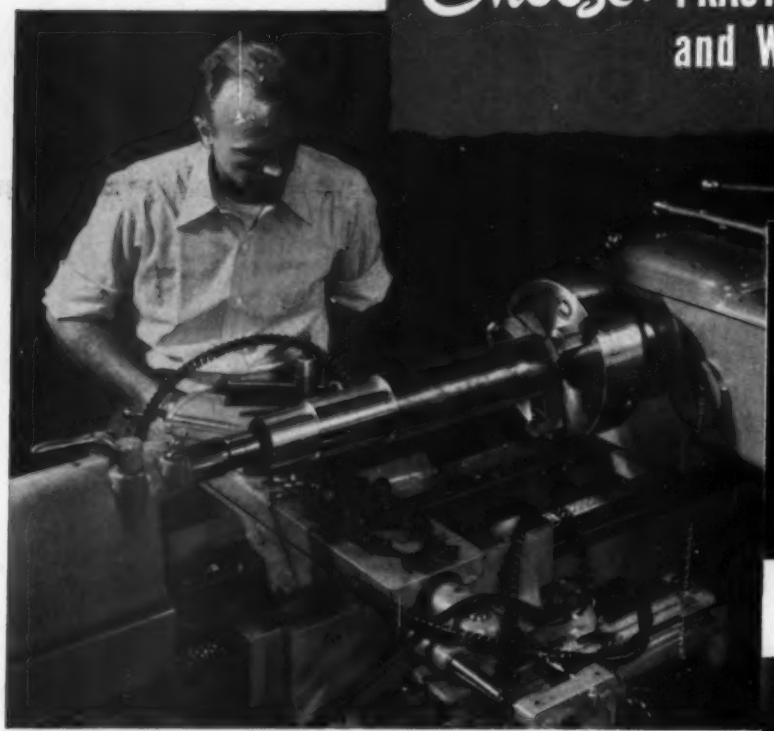

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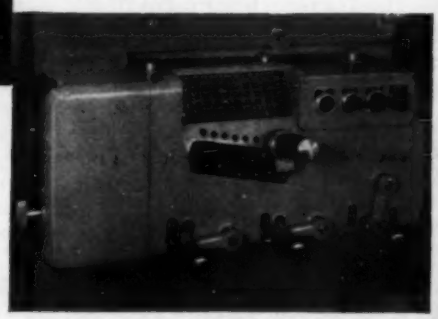

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INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

APRIL • • • • 1951

Preserving Our Educational Goals in the Present World Crisis

THOMAS A. HIPPAKA
Professor of Industrial Education
Iowa State College
Ames, Iowa

Young men are being called into the armed forces in ever increasing numbers. We are to have a military force numbering three and one-half million men by June 30, 1951. Present plans call for the drafting of 18-year-old youth of the land, in order that we may achieve this necessary military might. Bruce Barton is fearful that the education of our youth will be placed in the hands of men whose professional background is:

> *Don't question; don't argue; don't talk; don't think. Never mind the cost. Do what you're told.*

Mrs. Anna Rosenberg, assistant secretary of defense, gives the parents of America her assurance in these words:

> I share General Marshall's certainty that the sense of participation in the maintenance of our democracy and the association with other fine young men will build the characters as well as the bodies of our trainees.

Long time educational planning is the crying need in America today. Our armed might must be accelerated to full strength as rapidly as possible. However, if we do not balance the technological, scientific, social, moral, political, spiritual, and military development of our people, we may find America a corpse in armor. The development of a well-integrated individual, morally and spiritually sound, must remain our ultimate goal, for it is he who makes the better soldier, as well as the best citizen. Dr. Samuel Stevens of Grinnell College would remind us that:

> We must assume, whatever the nature of the conflict, that there will be an ongoing life for this nation afterward. It seems utter folly to suppose that the social, economic, and political problems of a peace following another holocaust will be so simple of solution that we will be able to solve them without the aid of the most highly trained and highly educated people that we can produce.

The Inestimable Worth of the Mental-Health Minded Teacher

If we are to preserve our educational goals we must have mental-health minded teachers who believe that their profession is the most important one in the world; teachers who endorse with all their heart and soul the importance of the work of the teacher so ably expressed by Daniel Webster in these words:

> If we work upon marble, it will perish; if we work upon brass, time will efface it; if we rear temples, they will crumble into dust; but if we work upon immortal minds, if we imbue them with principles, with just fear of God and love of our fellow men, we engrave on those tablets something which will brighten to all eternity.

The sensibly mental-health minded teacher is an imperative today. Fear and despair are apparent in too many instances. People who are mentally ill are constantly increasing in number. They now outnumber those who are physically ill, and their plight is generally more serious. As teachers we might very well observe some simple axioms whereby we can send youth on its way possessed of good mental health:

1. At the outset, we need to realize that no human being is born bad.
2. Each student must have every opportunity to succeed in school; a satisfying reward for effort well expended. It is through honest effort rewarded by success that he gains self-respect and self-confidence, so essential in this life.
3. Every pupil should be stimulated to work to capacity.
4. No human being wants to be a failure; nor will he be a failure if we understand his limitations and individualize his program to show him off to advantage. However, it is humanly impossible for any teacher to do this when he has as many as 200 pupils per day.
5. The average youth is primarily a creator, and it is through appropriate activity for him that he is endeavoring to gain personal satisfaction and to some extent, group recognition, approval, and even admiration.
6. Young people do not play truant if they gain more satisfaction in school than they do on the street; where the pull of the school exceeds the pull of the latter.
7. As educators we must work through pupils strengths and not magnify unduly student weaknesses, although we do point them out.
8. Youth needs to be taught that most work worthy of the name requires real effort and generally presents obstacles which must be overcome.
9. Every effort should be made to conserve and to enrich the natural eagerness, spontaneity, originality, constructiveness, and curiosity of our students.
10. Boys and girls rightfully demand a progressive living situation which satisfies

their impulses toward self-realization. An unfavorable environment offering very little opportunity for recognition along normal and wholesome lines leads to delinquency and crime.

11. A goodly variety of enthusiasms, interests, and abilities constitutes the best insurance against emotional bankruptcy. If and when one outlet is blocked, energy can then find expression in some other direction.

12. To give the pupil reasonable tasks for which he is responsible, constitutes excellent mental and moral training. These tasks need to be useful, and the student should be given some freedom to work them out. Failure to assume responsibility should mean the loss of certain desirable privileges.

13. Youth should be taught to face reality with courage and intelligence regardless of the difficulty of the situation.

14. Our chief concern is not to find out what Sam and Jane must do to be "normal"; it is to discover what he or she can do reasonably well with a feeling of satisfaction, success, and social approval.

15. In spite of our very best efforts, there are times when we fail. Failure, too, teaches us something, and having learned the hard way we proceed anew.

16. The whole student and not just the academic part of him comes to school. The traditionally presumed dignity and superiority of the academic goal needs to be shaken from its pedestal of exclusive justification.

17. The whole youngster is growing; acts and attitudes cannot be isolated; every pupil constitutes a total pattern of systems of energy. As we witness his growing pains we want to be certain that he is growing satisfactorily for him.

18. If we are to understand human behavior, we must understand certain fundamental human drives. Behavior must always be interpreted in terms of drives which are sex, hunger, success, approval, a sense of belonging, security, and even romance. When we discover the drive behind a human act, then and then only can we intelligently assist the individual. Any teacher can use to advantage such human drives as success, approval, a sense of belonging, and security appropriately earned.

The mental-health minded teacher is practical in his approach. While he recognizes human frailties as well as strengths, he consistently insists that his students work to capacity; that they take realities, however unpleasant, in their stride; and that moral toughness is an attribute to be cherished, an imperative essential in a tough world. From the *Arkansas Parent-Teacher* come these lines under the title, "I Have a Son and Daughter":

> I want life to be hard for them, to temper them like steel.
> I want them to be brave and strong — brave and strong physically, mentally, morally, and spiritually.
> I want them to be tempted, but not to yield.
> I want them to succeed after much effort, that they might learn patience.
> I want them to love, even though it cost them anguish, because then they would know that through love we grow.
> I want them to have great decisions to make, because then they would learn to go to God.
> I want them to work hard, to be physically exhausted, so that they would marvel at the greatness of their bodies (holy temple).
> I want them to face hours of grief that would bend their knees in prayer.
> I want them to yearn for the finer things of life, but have the courage to take only what they can afford and be happy.
> I want them to value honor above fame.
> I want them to look neither up to the rich nor down to the poor.
> I want them to be tolerant with their fellow men.
> I want them to know how to play as well as work.
> I want them to laugh and sing and make the most of each day.
> I want them to have these experiences and more, to help them to become a man and a woman.

The most important task of any human being is to make of himself a real person. Personality is made; it cannot be purchased at the corner drugstore. Heredity, environment, and our personal sense of responsibility constitute three indispensable elements essential to our growth. What is ours through heredity was and is beyond our control. There are times in the lives of all of us when we can do very little about our environment. However, every mentally healthy person accepts for himself the concept that each and every one of us must assume responsibility for our acts; our Creator blessed most of us with an abundance of human assets, and we must make all we can of ourselves. Youth needs to learn this. In the words of Harry Emerson Fosdick:

> Life is a landscaping job. We are handed a site, ample or small, rugged or flat, whose general outlines and contours are largely determined for us. Both limitation and opportunity are involved in every site, and the most unforeseeable results ensue from the handling — some grand opportunities are muffed, and some utterly unpromising situations become notable. The basic elements in any personal site are bound to appear in the end no matter what is done with them, as a landscape still reveals its size and its major shapes and contours, whatever the landscape architect may do. These basic elements, however, are to be accepted, never as humiliations, commonly as limitations, but most of all as opportunities and even as incentives.

Citizenship

The very life of a democracy depends upon the caliber of its citizenry. Man is the real problem in a democracy. Progress in a democracy depends upon the improvement made in our human material. This improvement is never made wholesale; instead, it is characterized by every citizen improving his own conduct and being strictly accountable for his personal living. Nicholas Murray Butler has fittingly described in these words the kind of citizen America must have if she is to retain her true greatness:

> The typical American is he who, whether rich or poor, whether dwelling in the North, South, East, or West, whether scholar, professional man, merchant, manufacturer, farmer, or skilled worker for wages, lives the life of a good citizen and a good neighbor; who believes loyally and with all his heart in his country's institutions, and in the underlying principles on which these institutions are built; who directs both his private and his public life by sound principles; who cherishes high ideals; and who aims to train his children for a useful life and for their country's service.

Only as a responsible people can we remain a free nation. Important as it is to have vocational competence, that is not enough. Our duties as citizens should never be overlooked as we gain a substantial livelihood in America, for if we neglect them, we can lose the freedom in which we now earn our living as free men. This all-important business of citizenship means that each and every one of us assume his rightful responsibilities intelligently and courageously in the home, school, church, community, state, nation, and the world. We must be certain that we understand the

democratic institutions which we have created, and that we are their masters and not their slaves. Each proposal of our government must be carefully examined by every citizen in terms of its effect upon our freedom. Responsible people know that our indifference can become our greatest curse; if democracy should ever fail, the failure will be due to our apathy. This concept was well expressed by Benson Ford in these words:

> If I had to select the one characteristic which distinguishes a free country, I think I would say that it is a faith in the individual and a conviction that each of us has not only rights, but responsibilities.

As intelligent followers, for all of us cannot hold office in our democracy, it becomes our inescapable duty to elect to office leadership with integrity, intelligence, and ability. Good people must eliminate bad people from our government.

Leadership with moral integrity and the necessary capability has a right to look to us as followers for our wholehearted support. We need to realize that the subversive forces are constantly at work on our leadership. Night and day these forces grind away while too many right thinking people continue to think good thoughts, but do not act. Time and again we have witnessed the scene in our own country where honest men have resigned their posts because they could not withstand the pressures of evil men. These pressures have killed many valuable men prematurely in the line of duty. Whenever good men resign or die under such circumstances, democracy loses ground. We, as intelligent followers, must not only elect honest and tough leaders; we must let them know quite regularly that they have our wholehearted support, our approval, and even our sincere praise, as they perform their arduous and, too often, thankless duties. Followers and leaders — all have a duty to perform. They must keep one another informed; work as a team for the common good of America.

Character

> States are made, not from rocks and trees but from the character of their citizens which turn the scales and draw everything after them. — *Plato.*

It could very well be said that we are confronted with a crisis in character. Honesty is lacking in our social living. Men lie because they lack the courage to face reality. Moral courage is a commodity noticeably lacking in our leadership. Industry is constantly telling us to look well to our job of developing character in our schools. We are accused of devoting too much time and effort to the teaching of facts and not enough energy and thought to the development of good character. Apparently we have not wanted the real values of life badly enough. Divorce, delinquency, crime, fraud, and even war constitute glaring proof of these assertions. The crying need is for men of stature in business, industry, education, and government.

Good character must flourish freely in a democracy if it is to survive. Many of the problems encountered in a democracy are fundamentally problems of human character. Progress in a democracy depends very largely upon the character of its people.

What then is character? From a News Letter in the *Future Teachers of America*, October, 1946, comes this very excellent concept of character:

> In the home, it is kindness;
> In business, it is honesty;
> In society, it is courtesy;
> In work, it is thoroughness;
> In play, it is fairness;
> Toward the fortunate, it is congratulation;
> Toward the unfortunate, it is sympathy;
> Toward the weak, it is help;
> Toward the wicked, it is resistance;
> Toward the strong, it is trust;
> Toward the penitent, it is forgiveness;
> And toward God, it is reverence and love.

Apparently, character is the synchronizing of stability, tolerance, firmness, confidence, humility, reverence, courage, prudence, forgiveness, and affection in the human being.

Men of character live their own lives. They develop high ideals and standards of conduct; they possess sound convictions. They mean to be honest, and they are honest. These men adhere to their convictions in spite of any and all consequences. Only fools do that which is most convenient and pleasurable.

A country never rises above the ideals of its people. Ideals constitute character.

Men of character know that leadership in a democracy cannot expect immediate, glowing recognition. Approbation and acknowledgment are often slow in coming for services rendered. Public servants must persevere in the face of severe and unjust criticism. Abuse and even injury will come their way. These they must take in their stride holding fast to the satisfaction that they have done their part in rendering a service.

Character takes self discipline. Men of character know that when they violate the laws of nature, the price paid is very high. They also know that in a democracy, discipline must come from within; in a totalitarian state, it is imposed from without. People who are unwilling to discipline themselves find someone else making their decisions for them; they have lost their freedom.

Men who value character build their lives on a solid foundation of morality, knowledge, and religion. Godliness and character go together. Just as a Godless man is a rudderless man, so a Godless nation becomes a rudderless nation.

It requires character to make ones private opinion, public opinion. We can no longer live in our ivory towers, self-satisfied and obliviously secure. Each of us must do our own thinking; only lazy and indifferent people allow others to think for them. Private opinion resulting from such thinking needs to be characterized by soundness. Nevertheless, it is of little value until we expose it to the public eye, when it becomes public opinion.

If we are to have any world at all, nations, like people, must look to their character. Hydrogen bombs a thousand times as strong as our most powerful atomic bomb are being contemplated. Nations must realize that power is given to them in trust, and they must prove themselves worthy of this trust or we will suffer world annihilation. Theirs is now a terrifying responsibility which they cannot shirk. For the first time in human history mankind possesses the power to destroy the world. Our character will go a long way toward saving us. Dr. William Kavanaugh realized this when he wrote:

> As I grow older I am placing greater stress than ever upon character, for the simple reason I am finding out that on it depends everything, absolutely.

If we are to preserve our democracy; if we are to save civilization itself; we must afford character education its rightful status in our schools. Without adequate character qualities, people and even nations will utilize knowledge, skill, and power for purposes of destruction. Many years ago, no less a person than John Ruskin gave

(Continued on page 175)

Textbook Utilization—A Problem in Vocational Curriculum Planning

J. DOUGLAS WILSON
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Curriculum Division, Los Angeles City Schools
Los Angeles, Calif.

"Why don't more vocational instructors recognize the value of good textbooks?" a representative of a large publishing house recently asked me. I replied startled! "Don't they?" And he answered, "In some cases, certainly yes, but in other cases, I am still not so sure."

What are the facts?

Two basic premises should be made prior to a discussion on the question.

Vocational Programs Require Related Work

The authors of the Smith-Hughes Act were wise enough to insist on "at least 25 per cent of the program must be spent on related subjects," showing that even in that early day a vocational training program consisted of more than manipulative work.

Related Training Program Needs Textbooks

The related training units referred to in this article cover such topics as trade drawing, mathematics, sciences and layout, topics which presumably can be adequately covered by the use of good textbooks.

However, some manipulative units are very closely knit with some phase of technical training. For example, how can one teach the use of tools without covering tool sharpening, which in turn requires the emphasizing of the kinds of stones, use of oil, kind of stroke, bevel of the tool, and other kindred topics?

I. A Number of Questions Need Answering From the Viewpoint of Several People or Groups

A. *Instructors*

1. Do vocational instructors recognize that textbooks are an effective method of teaching the technical phases of their program?

2. Are there sufficient vocational texts available to give an instructor a satisfactory choice to meet the training situation *as he sees it?*

3. What are the shortcomings of some instructor-prepared materials?

B. *Publishers*

4. Why do good published materials fill the bill better?

C. *Teacher Trainers*

5. Do teacher training courses adequately prepare a vocational instructor on *How to Use* a textbook properly?

6. Do teacher training courses train teachers on *How to Select* a suitable textbook?

D. *School Administrators*

7. Do school administrators realize that modern vocational courses require adequate library funds?

E. *Students*

8. How large should a book budget be per student?

9. Are vocational students prepared to carry out study work at home or in shop on textbook assignments, or do they take a vocational course because they think it will be an easy credit without the study of textbooks?

F. *Advisory Committees*

10. Do vocational advisory committee members realize and understand that technical training is necessary, and do they support the vocational school which emphasizes some "book learning."

II. Each of These Questions Is Discussed in the Following

QUESTION 1. *Do vocational instructors recognize that textbooks are the answer to teaching the technical phases of their training programs?*

No doubt the answer is yes for many vocational instructors. In the California Apprenticeship Training Curricula, materials and textbooks are definitely the backbone of the courses of study. These new courses, primarily for evening schools, have been constructed on the basis of workbooks, textbooks, and yearly final examinations. Each workbook includes a definite set of lessons which are of two types: (1) Assignment sheets based on definite topics and pages in specified *textbooks*. (2) Information sheets, of which there are relatively few, on topics which are not covered in a textbook but which are needed to round out the course of study.

In the day trade school classes at Los Angeles Trade Technical Junior College (formerly Wiggins Trade Technical Institute) textbooks have been used for a good many years in the teaching of related subjects, the limitations as to their use being conditioned mainly by the lack of a book which would adequately cover a subject. As new books appeared they have been adopted and used.

The adoption of the California Apprenticeship Curriculum Courses by many other states provides additional evidence that the use of textbooks for the teaching of related subjects is widespread. Without question, many vocational instructors could provide more information showing that textbooks are used to advantage in many vocational programs.

However, there are certain factors which must be considered by both industrial arts and vocational instructors. In many cases the *problem youngster* is the one who *selects* or is *assigned* to vocational classes. This type of boy or girl is rarely a good reader and shuns books as an unpleasant symbol of academic methods and subject matter. The teacher, in despair, may finally abandon the use of adequate texts for simpler devices to get his material across. This has the effect of lowering the quality of the end product — the skilled craftsman.

The teachers of apprentices are usually selected from the ranks of practicing craftsmen who themselves may have a basic fear of books and the printed word. They are

less inclined to favor a *library* of technical books as a core of instruction. This has the effect of a vicious cycle that could gradually wipe out the high standards of workmanship. We need good intelligent youngsters to feed into our vocational programs. In other words, it takes intelligence to read intelligently.

QUESTION 2. *Are there sufficient vocational textbooks available to give an instructor a satisfactory choice to meet the training situation as he sees it?*

This question should not even be raised; however, some instructors do raise it. All one needs to do is to study the catalogs of the various publishers of vocational texts to see that the problem becomes one of which book to choose rather than that of insufficient books being available.

The continuous appearance of new books on vocational subjects indicates qualified authors and publishers are making every effort to cover the entire field and to cover new subjects as fast as technological developments occur. The situation, from the textbook publishing viewpoint, I think, is excellent.

Any good textbook worth its sale has been written by a competent author after approval of a complete outline by an editorial advisory board composed of well-known experts in the field and recognized vocational educators. The outline is based on a comprehensive trade analysis. After that, the managing editor, with a wealth of bookmaking experience behind him, guides the author in the writing of the book and approves the chapters as they are written. Then an experienced illustration and editorial staff go over the material and weed out many difficulties to student learning. A book is the composite result of scores of experts each practiced to contribute his experience and background. Each book that is published represents many thousands of dollars investment.

QUESTION 3. *What are the shortcomings of instructor-prepared materials?*

There are many obvious reasons why material written by instructors is not always satisfactory.

1. In teaching a lesson, new topics often arise for which the instructor has no available material to hand out immediately.
2. Not all instructors have the ability, training, or time to write.
3. The preparation of illustrations for a written lesson is a slow process and must be done so it can be reproduced, for which suitable reproduction equipment must be available.
4. Blueprints are not difficult to secure providing the instructor has the time to prepare them and has the means of blueprinting.

QUESTION 4. *Why do published materials fill the need better?*

A good textbook is the answer to most of the difficulties listed in the foregoing plus the great advantage of always having the material ready exactly when wanted. Lesson material in textbook form, if the instructor has planned wisely, is in the hands of the student who can study today's assignment yet review previous lessons since the lesson material is readily available.

It may be argued that the use of published materials limits the instructor's opportunity to grow professionally and educationally — a growth which comes from writing lesson materials — but a teacher who is on his toes will always have a job of organizing and planning his lesson material. The planning of a lesson in written form which teacher training classes advocate so strongly — and rightly so — requires ability to analyze, organize, and write out the procedure the instructor expects to follow including:

1. The lesson objective
2. The arrangement of topics, references, and questions under the four steps of instruction, namely, preparation (of the class), presentation, application, and testing
3. The listing of teaching materials to be used or selection of textbook materials
4. The preparation of tests to evaluate his instruction and the student's knowledge

Certainly this phase of teaching provides ample opportunity for the development of a writing skill if such is desired — and desirable.

QUESTION 5. *Do the vocational teacher training courses adequately prepare a vocational instructor on how to use a textbook properly?*

No answer can be given to cover the national picture. Do most vocational teacher training classes continue to emphasize trade analysis and objectives instead of how to utilize existing instructional material? Are teachers actually expected to write all the instructional material for a given course of instruction? Is it recognized that this process has been performed thousands of times and the material is available in countless books?

It becomes then a question of emphasis. Teach the new instructor to use what is already available in the way of training program outlines and textbooks, as well as the procedures which should be followed in order to make a trade analysis; that is, teach him how to analyze in order to help him arrange his training program into logical order.

Since we are so convinced that textbooks are a must for English, history, mathematics, and other academic courses, why not use good texts for vocational subjects? The process of learning and the principles of good teaching are the same for both vocational and academic subjects.

How should a textbook be used? Some thought should be given to the following questions if adequate use of textbooks is to be made in a vocational program.

a) Should definite textbook assignments be given to vocational students in the same manner as is done in the more formal academic classes?

b) What constitutes an assignment?

c) Should checkup questions be made by the shop instructor for each lesson.

d) How should the student's papers be graded?

e) Should a shop student be required to master or pass each examination satisfactorily? After all, technical knowledge is the basis for his advancement in the trade. If he does not know the subject, how can he advance?

f) Should the shop teacher have a good classroom or do the related work in the shop. Presumably, many or most shop buildings are too small as they are and do not permit space for separate classrooms. Hence, how can the related work best be taught?

g) How long should a home assignment be, if given? If no home assignments be given, when should a study period be provided?

The answers to these questions should be included as a part of a teacher training course.

QUESTION 6. *Do the vocational teacher training courses train a teacher on how to select a textbook?*

It may appear that this question is really a part of the previous one; perhaps it is related to it. However, a few statements

may suffice to show that there are definite book selection factors which can be described.

1. *Typography:* Probably the *first impression,* that is, the typography, is all important. The jacket, the cover, the size of the book, the size of the type, kinds of illustrations, number of illustrations, clarity of the drawings, are all items which can be quickly checked. The durability, sturdiness of binding, whether the cloth is waterproof or not, is also important.

2. *The author:* Who is he; what is his standing in the profession? This can be easily checked if the flyleaf tells the background of the man who wrote the book. Also, the preface should indicate what the author had in mind when he wrote the book.

3. *Organization of content:* Instructional sequence of topics and organization of content.

4. *Teaching aids:* Generous use of line drawings, simplicity of writing, use of common trade terminology.

5. *Adaptability:* Adaptability for industrial, school, library, or home use.

6. *The publisher:* Those familiar with vocational education know that certain publishers are outstanding in serving special vocational education needs.

7. *The index:* One publishing house is on record as saying that a technical book without an index is not worthy of printing.

8. *The date of publication:* Some books will never grow old, as their subject matter is based on principles that never change. However, a new book may suggest newer methods of teaching or a fresher approach to the subject matter presented. The publication date should be checked.

9. *Study guides:* Another factor to consider is whether or not study guides are available to go with the books. This is of great help to both the teacher and the student.

A study of these nine factors should give a new instructor a safe basis for the selection of a textbook. These items should be discussed in vocational teacher training classes.

QUESTION 7. *Are school administrators aware of the need for a book budget for the shop courses?*

The answer will be a "Yes" and a "No"; but does not the answer depend somewhat on the teacher's outlook and training program outline? An enlightened school administrator is one of the biggest helps vocational education could ever have.

School administrators will react favorably to book budgets for vocational courses if training programs are written to include the use of textbooks for the teaching of technical subjects. However, such programs need to be *sold* to the department head, supervisor, or principal on the basis of better teaching and helping the student.

It is questionable whether we do not overemphasize the opposition we get from the administrator regarding the use of adequate textbooks for vocational classes. If he is *sold* on the use of textbooks for English, spelling, history, geometry, etc., why should he be *unsold* on their use and desirability in vocational classes? His only opposition might be that the type of individual in vocational classes does not take kindly to the reading of textbooks, consequently textbooks should not be required. In that case, it would be advisable to change the *type* of young man or woman selected for the training program.

QUESTION 8. *How large should a book budget be per student?*

It is difficult to give a definite dollars-and-cents amount. This question should probably be answered somewhat from the student's viewpoint. In most states, textbooks are furnished *day school* students without cost as a part of free public education. For *evening adult school* students, however, most state laws do not permit the issuance of free textbooks to adult students.

The problem of financing the required books for a given course of study, therefore, is pertinent to the wage earner ambitious to improve his status in the industry or occupation in which he works. Not only should the books be selected with care, but also the number of books required be kept to a minimum in keeping with *a good training program* and the apprentice's, or learner's income.

What constitutes a reasonable book budget in the apprenticeship program? This is not an easy question to answer; and, of course, the answer will be different for each occupation.

Considering an average apprenticeship program, the total book budget per student should be thought of in terms of:

1. A four-year apprentice program period.

2. An investment in books usable as a reference library *long after the course is completed.* Except in those occupations which change because of technological developments, a good textbook is usually good for years.

3. Apprentices must be taught to realize that learning a trade is not an educational process to be performed in a short period of time with little or no cash investment of their own. Comparing the book requirements in a four-year college course with an apprenticeship program will quickly show that a book budget of $40 or $50 for the apprentice is not excessive or even large. The apprentice "earns as he learns"; whereas, most college students have to be content with any odd job they can find to help them finance their college education. Hence, apprentice students should have no complaints whatever when asked to buy a set of books as a part of their training program. Certainly it never occurs to a student to question the selection of texts made by the university instructor.

4. It is desirable and necessary that the book or books selected adequately cover the subject. However, the students should not be asked to purchase any book in which but a few pages are referred to in the lesson material. Such books should be made available to the instructor to check out from the library as needed.

Many teachers have technical libraries that cost hundreds of dollars because they considered the cost incidental to the value of obtaining new knowledge in their chosen field of work. Most good craftsmen are the same way — always searching for new information in trade journals, technical magazines, and books.

The teacher and apprenticeship committee share the responsibility of selling the apprentice on the training program. If he sees the importance of technical knowledge and realizes the necessity of a wealth of background material obtained only through the study of text and reference books, he won't object to number nor cost of the books.

NOTE: Since studying, reading, and classroom instruction are integral parts of our apprenticeship training programs, isn't it logical to require *capability, willingness,* and *intelligence* in selecting applicants for apprenticeship?

QUESTION 9. *Are vocational students prepared to carry out home or shop study, or have they selected the shop course because there is no "book learning"?*

We are not obligated to make a tradesman out of every applicant. We cannot stuff knowledge down their throats and place skill in their hands. There must be a *desire or a wish to learn*. This is fundamental.

Shouldn't it be a part of every apprentice agreement that there is a *willingness* on the part of the trainee to undergo classroom related training and study? Do the apprenticeship committees want reluctant students?

We are so concerned with the coercive aspects of our training programs. The apprentice *must* attend classes; he *must* buy the required books. The apprenticeship committee even emphasizes this coercion by penalizing the apprentice who fails to attend classes properly. Employers even grant time and *pay* the apprentice for attending class. It is, it seems to me, a sad commentary on our apprenticeship selection procedure if we cannot find sufficient numbers of eager, interested young men who do not have to be coerced to attend classes which can benefit only themselves.

It is assumed by universities that those who are attending are there for the purpose of learning. Those who are not, are gratefully dropped from the institution and the time devoted to the worthier students.

In the earlier days of vocational education it was a popular belief that the mentally slow student would be ideally suited for the vocational class. Today the experienced vocational educator knows the fallacy of this statement. He also knows that, by the law of averages, he will have some students who can make some progress in acquiring actual tool skills but will be quite slow in the related training program units. However, if the training program is set up to require textbook usage, certainly there will be an acceptance on the part of the students that they will be required to study the various technical assignments.

Especially now with vocational education moving into the post-high school level of learning, such as junior colleges and technical institutes, isn't it logical to expect a higher standard of qualification for such students? Or are we going to go to school longer and longer for less and less knowledge?

QUESTION 10. *Do vocational advisory committee members realize and support the vocational school which emphasizes the acquiring of technical knowledge through textbook usage?*

There are two kinds of vocational schools — those who have the backing of labor and those who have not. The difference is astounding! The vocational school administrator must get labor and industry's cooperation before he can ever build a good program. Good vocational programs seem to use many vocational texts — poor ones do not. The reason is evident.

Summary

Textbooks are certainly basic to any modern, up-to-date vocational training program. For the majority of occupations, suitable textbooks are available and new books are continuously being published which enable an instructor to keep up to date.

Teacher training courses should give greater emphasis to the problem of textbook selection and usage.

School administrators will react favorably to book budgets for vocational courses if a vocational instructor plans and writes his training program for the technical phases of the trade around textbook usage and then *sells* the program to his department head, supervisor, or principal.

An instructor is, after all, one individual with the limitations that one individual must have. Even one textbook that has been properly planned, written, and published is the combined effort of countless experienced people. It is immediately available to the student and teacher *at all times*.

The teacher, on the other hand, is available to the individual student in inverse proportion to the number of other students in the class. The teacher's time is exceedingly limited, and the amount of knowledge that he can impart on an individual basis is also limited. Also, learning is far more important than teaching. Teaching is the medium, learning is the goal. The student cannot be taught unless he has a willingness to learn, regardless of the source, whether it be the teacher, on-the-job experience, a book, manufacturers pamphlets, films, charts, or any other learning aid.

The following advantages are listed not to disclaim the value of other learning aids, but to point out that a text compares very favorably with any of them.

In comparison with visual and other learning aids, the textbook stands high on the list.

1. It is comprehensive, yet any portion of it is always available.
2. It is compact, easy to carry and store.
3. It requires no other supporting equipment. All that is needed is light and vision.
4. An average textbook has many illustrations, charts, tables, etc.
5. It is available for reference now, tomorrow, five, ten years from now and always tells the same story. It does not forget.
6. Its outline is usually based on an outline of the trade.
7. One can always reread a text and discover something not noticed before. This is one of the precious qualities of a good text.
8. Its content is unlimited and grows with one's ability to comprehend it.
9. A text is inexpensive to the individual compared to the thousands of dollars it took to produce it. It is inexpensive compared to many other learning aids.
10. The book has always been important. Education was carried on with books before school buildings grew into palaces. Scholarship and learning came into their own through teachers' and children's use of books. And there is substantial evidence to prove that books are the most economical as well as the most helpful aid to schools at the present time.

One Final Conclusion

The national average spent for textbooks of all kinds is somewhat less than 2 per cent of the national school budget. Think of that! And with the millions of textbooks that are used, one must come to the conclusion that books are very cheap.

* * *

Canada and the United States have lived at peace for many years, and more and more we realize that our common welfare requires close co-operation and friendship. . . . *Dr. C. C. Goldring, Director of Education, Toronto, Canada.*

* * *

The enemies we face outnumber us in man power. The way to assure the national security of the United States against those enemies is to improve the quality of our man power. Effective training is one of the ways this can be accomplished. . . . *Aldo L. Raffa, Training and Educational Specialist, Office of Manpower National Security and Resources Board.*

Post High School Education—The Vocational Viewpoint

C. L. GREIBER
State Director, Wisconsin State Board of Vocational and Adult Education
Madison, Wis.

I believe that business people, farmers, and labor realize the important role that education must play in our economic system but they are becoming increasingly critical of the fact that the school curriculums are often built upon tradition which stereotypes the content and offerings, and is not built upon the needs of the people. Naturally, as professional educators, we must play an important role in the development of educational programs, but it is also important for us to take time to get the sound advice of the lay public, who will in turn help us to shape our offerings to meet the real and vital needs of the people.

With this in mind we must be interested and concerned in developing the finest co-ordination possible between our respective educational agencies in expanding programs of post high school education. This is a matter which is of major concern at this time because it is recognized that there is a greater interest today in adult and post high school education than ever before. Estimates based on national, state, and local surveys indicate that upwards of 40,000,000 adults are interested in continuing their education in some form. There is also ample evidence that this interest has increased during the postwar years.

National Emergencies Called Forth Advances in Science and Technology

Two world wars within the past forty years and the present national emergency have given impetus to great advances in science and technology and our economy requires informed and well-trained citizens today as never before. Adequate opportunities for training and retraining must be available to our people otherwise industry and agriculture will not be able to meet the demands which are being made today for even higher production levels.

Naturally many education agencies and organizations feel a responsibility in the filling of the definite need for education and training which is expressed by all adult age groups and covers both vocational and general education offerings. The job to be done is so great that it will require a well-co-ordinated combined effort rather than an attempt by one agency to do the total job.

I believe that vocational educators have a mandate from our congress to provide educational services to adults including programs of a specific post high school character.

It was undoubtedly the intention of the 64th congress which enacted the Smith-Hughes law that certain of these funds be earmarked to provide educational opportunities for adults. This is indicated in the provisions of the act which state that at least one third of the sum appropriated to any state for salaries of teachers in trade, home economics, and industrial subjects, if expended, must be applied to part-time classes for adults — both young and older adults who have entered employment.

The State's Responsibility

Many states have recognized their responsibility in this regard and have earmarked more than the required amount of federal funds allotted for the purpose which has been stated. In my state we have tried to clearly envision the task of providing for the educational needs of out-of-school youth and adults alike. This has meant continual re-evaluation of our programs to the end that the vocational education needs of our adult citizens are realistically met. The result of our evaluation has shown the need for an expanding program of post-secondary vocational education, in which (1) youth and adults can obtain adequate training for employment, (2) where provision is made for occupational upgrading, and (3) where there is full opportunity for general education which leads to an improved understanding of personal, social, and civic problems that assist the student to meet more ably his responsibilities as a worker and a citizen.

During World War II vocational schools of the nation were called upon to provide organized training to adults so that the war effort might result in victory for the nations which had banded together to protect the rights of free people in this world. More than 11,500,000 adults were given training through the several war training programs administered and conducted by vocational education which operated during the period 1940–45 and due recognition has been accorded for the service which was rendered to our nation in this matter. Attention is today again being centered upon the need for establishing defense training programs to upgrade the skills of adults who are being employed in our ever expanding industrial defense economy.

Vocational Education and Defense Training Programs

At the present time it appears that the facilities of vocational education may be utilized in a new defense training program. Similar demands may be made upon the system of higher education. We should be planning today in our respective states to co-ordinate our efforts in such new developments to the end that there will be no duplication of effort, competition for instructors, or wide differences in salary schedules. Let us recognize that in many programs vocational education can do the job best and in others the institutions of higher learning can best fill the needs.

An important segment of the population desiring additional education is composed of the so-called youth groups, persons who recently completed their training in the secondary schools, who recognize the importance of obtaining training on the post high school level in order to adequately prepare themselves for employment in our technological economy. Unless educators recognize their responsibility for

providing educational opportunities in both vocational and general education on the post high school level for this important segment of our population, we may again see the return of federally subsidized and controlled programs to meet the new and continuing training needs of these youth. During the period when the national emergency educational programs were operated in the 1930's educators stated that in the future this responsibility would be met on the state and local level so that education might continue as a matter of state and local concern and control. This is a responsibility which we must meet otherwise we cannot be critical of the development of programs by the Federal Government to do this important job.

The interest of vocational educators in post high school programs of a vocational technical training character was demonstrated in 1943 when a nationwide consulting committee of 25 members representing the interests of management, labor, and education including engineering colleges, technical institutes, and vocational education was appointed to study this problem and to report their findings and recommendations. These findings were incorporated into a bulletin issued by the Federal Security Agency, U. S. Office of Education entitled "Vocational Technical Training for Industrial Occupations." A study of this bulletin will bear out the fact that vocational schools have been conducting such offerings for a number of years. Since the report was published these offerings have been further developed and expanded by the vocational education system in the several states.

Community Colleges

Most of you are familiar with the philosophy of Dr. James Conant, president of Harvard University, regarding the need for expanding and improving two-year terminal programs. Dr. Conant has stated that when we consider any vast expansion of our post high school education in terms of expenditures of society that the objective should be to provide that the boy and girl live at home where possible. He feels that community colleges should be established throughout the country which will emphasize terminal programs. He has said that these institutions should not be regarded as part of a college course but that the way should not be blocked for students who enter these institutions from making a transition either to a four-year university program in the same town or city or to a distant locality. He hopes that businessmen will gradually come to judge applicants for white collar positions less in terms of the length of a college course and that they will regard the completion of a two-year terminal course as adequate education for the first step on the competitive ladder.

I am, of course, most familiar with the situation as it relates to post high school education in my own state. We have experienced a growth in the demand for post-secondary educational opportunities witnessed by the fact that our schools, which formerly served a large group of secondary aged youths, now serve adults to the tune of 90 per cent of our total enrollments. Our statistics further reveal that thousands of high school graduates were enrolled in our schools during the 1949–50 school year, which indicates the growing importance of post-secondary vocational training. For a number of years our vocational schools have organized their educational planning to develop opportunities for those youth and adults who seek suitable post-secondary education of the noncollegiate type. This has resulted in the establishment of many courses of a post-secondary vocational-technical character. Such courses are presently in operation in all of the vocational schools established in cities with a population of 20,000 or more and in some instances are established in schools located in cities of a lesser population.

Plans are being carried forward at the present time to further expand these offerings so that the vocational schools may continue to be service stations for meeting the educational needs of all of our youth and adults including those who desire specific vocational-technical training in the immediate post high school period. We agree with Dr. Conant that every attempt should be made to provide for an increasing number of boys and girls in our state post high school education opportunities which are close to their home and which will meet both their general and vocational technical education needs.

Junior College Needs in Wisconsin

The planning in my state is based upon certain specific recommendations which have been made by authorities in the field of higher education from both within and without our state.

In 1947 a bulletin entitled "Junior College Needs in Wisconsin" was issued by the University of Wisconsin. This bulletin was based upon a study made by Dr. John Guy Fowlkes, dean of the School of Education, and Dr. Henry C. Ahrnsbrak, research assistant, University of Wisconsin, and made the following recommendations:

> The curricular offerings and the rehabilitation and guidance functions which schools of vocational and adult education are authorized to offer and perform in Wisconsin seem to meet well the requirements for liberal terminal combined with vocational terminal education at the junior college level as defined above. Therefore it seems that properly qualified vocational and adult education schools in Wisconsin should be formally designated terminal junior colleges.

During the past year the Governor's Commission on Public Higher Education employed The American Council on Education to make a survey in the lake shore area of our state. The survey team of The American Council was headed by Dr. Arthur Klein, formerly dean of the School of Education of Ohio State University. The report written by Dr. Klein and his associates included the following significant recommendations.

Recommendations of the Dr. Klein Report

The developments in technology and social organizations require that the level of the vocational preparation of considerable numbers be raised to the junior college terminal level both in the strictly technical and in the related phases of such preparation.

This is an objective that differs markedly from the objectives of preparing for occupations at the degree level. Selection of content, its organization and the methods used demand freedom from the standards and controls that may properly be exercised in developing programs leading to the bachelor's degree and beyond. This freedom will be lost if junior college terminal programs are developed with one eye on degree program requirements: the distinctive educational service to be rendered will thus be distorted and handicapped. For these reasons the survey staff urges strongly that junior college terminal programs be developed without any purpose whatsoever of making them fit the academic requirements of college degree programs.

The survey staff believes that the voca-

(Continued on page 176)

Minnesota's New Industrial-Arts Curriculum

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The state of Minnesota has adopted a new industrial-arts curriculum. It is much broader and gives students many more experiences in junior high school and enables them to specialize in senior high school.

The following chart was reproduced from Curriculum Bulletin No. 13, *A Guide for Instruction in Industrial Arts*, state of Minnesota, Department of Education, 1950,[1] and shows the subject areas at the various grade levels.

Subject Areas and Grade Placement

Seventh Grade — Required Courses

(1) Metal; (2) wood; (3) plastics; (4) graphic arts; (5) leather; (6) disassembly and assembly

Elective Courses

Sketching, ceramics, textiles, Keene cement, rope and cord, power, rubber, paper and fiber, glass, models, fly tying

Minimum time in any one area — 12 clock hours

Maximum time in any one area — 30 clock hours

Eighth Grade — Required Courses

(1) Drawing; (2) electricity; (3) .....; (4) ..... (For Nos. 3 and 4 select from electives.)

Elective Courses

Metal, wood, graphic arts, crafts

After covering eighth-grade electives, additional electives may be selected from the seventh-grade list.

Minimum time in any one area — 18 clock hours

Maximum time in any one area — 45 clock hours

Ninth Grade — Required Courses

Plan A: (1) Drawing; (2) woodwork

Plan B: (1) Drawing; (2) woodwork; (3) .....

(For No. 3, select from electives.)

Elective Courses

Metal, graphic arts, electricity

Plan A: 90 clock hours in each area

Plan B: 60 clock hours in each area

Tenth Grade — Required Courses

At least one must be offered.

Elective Courses

General subjects, such as, general metal, general wood, general drawing, general electricity, general graphic arts, general power

180 clock hours, per year, in any one area

Eleventh and Twelfth Grades — Required Courses

Recommended electives

Elective Courses

Advanced Shop I and II or Specific Unit Shops, such as, architectural drawing, auto mechanics, cabinetmaking, carpentry, electric motors, machine shop, sheet metal, printing, radio, welding

The new curriculum is proposed to be carried on in the comprehensive shop

> . . . One equipped and arranged for presenting courses or units of work in several industrial-arts subjects or media — for example, a shop for the teaching of activities such as those in woodwork, drawing, plastics and metal.

in the majority of Minnesota schools, which are too small to provide area shops or unit shops. The complete program from the seventh grade through the twelfth grade can be provided in a comprehensive shop. In the Minnesota plan all students in grades seven through ten receive instruction in one area at a time, putting the general shop idea in the eleventh and twelfth grades where it is most effective.

The committee which formulated this curriculum made it flexible enough to fit any school. In the seventh grade for example — see chart listing Subject Areas and Grade Placement — the school may provide instruction in six areas with 30 hours in each area, or in 15 areas with 12 hours in each area, or any variation between these limits. The total number of hours per year in seventh grade varies from 72 to 180, depending upon the school.

This new curriculum is the result of cooperative planning, which has characterized industrial arts in Minnesota for many years. The Commissioner of Education, Dean M. Schweickhard, appointed a committee to develop a new industrial-arts curriculum in 1947. The committee was composed of industrial-arts teachers, supervisors, and teacher trainers, and school administrators. S. K. Wick, State Supervisor of Trade and Industrial Education, served as chairman of the committee. The committee submitted their work to the industrial-arts clubs of the state and to individual teachers for criticisms and suggestions, which were taken into consideration in the formulation of the plan. The material was edited and prepared for publication by the writer.

* * *

It is indeed questionable as to how much of a warm welcome the Koreans would give any Japanese who may be sent to their country to fight an aggressor. . . . *Jack L. Anderson, Director of Vocational Education, San Jose, California (and one of 19 educators sent to Korea in 1940 by the Civilian Affairs Division of the War Department).*

* * *

I would gladly swap some of the Latin or German which I was required to take in college for the ability to saw off a board without including my thumb! . . . *Thomas D. Bailey, Florida State Superintendent of Public Instruction.*

* * *

Some recent models of the Colt .45 use lightweight Alcoa aluminum forgings for the receiver and main spring housing.

[1] This bulletin is available at the Syndicate Printing Company, 501 Park Avenue, Minneapolis 15, Minn., price, 75 cents.

Some Leaders in Industrial Education

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(*Continued from page 55 of the February, 1951, issue*)

Vocational Education of Less Than College Grade

Shortly after the publication of the historic report of the Douglas Commission, 1906, the movement for securing federal aid for a nationwide program of vocational education of less than college grade got under way. Although the National Society for the Promotion of Industrial Education was organized in 1908, and immediately began the effort to co-ordinate the activities of all agencies and individuals interested, there was some working at cross purposes during the early period.

In 1907, Charles R. Davis, of Minnesota, introduced in the U. S. House of Representatives a bill providing for annual appropriations from the national treasury "for maintaining instruction in agriculture and home economics in secondary agricultural schools and instruction in mechanic arts and home economics in city secondary schools." The provisions of the bill evidently were drawn up without prior consultation with educational leaders, for Dr. Elmer Ellsworth Brown, United States Commissioner of Education, opposed the whole scheme. He demanded that, before any such proposals be submitted to the Congress, a thorough study should be made of the needs of children and youth, and of society, and urged that the advice and co-operation of experienced superintendents of schools should be secured. In this position, Commissioner Brown was supported by the National Education Association, the Department of Superintendence, and the newly organized National Society for the Promotion of Industrial Education.

A little later, in 1909, the executive committee of the American Federation of Labor announced its approval of the general principle of federal aid to the states for the promotion of industrial education. A special committee of the American Federation of Labor, appointed for the purpose, made a study of the Davis Bill, revised it in a number of important particulars, and prevailed upon Senator Jonathan P. Dolliver, of Iowa, to introduce it in the Senate. "By 1910, the agricultural and labor interests had been lined up in favor of the Davis-Dolliver Bill," and efforts were then made to secure the active support of the National Society for the Promotion of Industrial Education, but without success.

In 1911, Senator Dolliver died, and Carroll S. Page, U. S. Senator from Vermont, succeeded him as the sponsor in the Senate of legislation for industrial education. In April, 1911, he introduced the Page Bill in the Senate. In November, 1911, the executive committee of the National Society proposed certain changes and additions to the Page Bill, but these were not seriously considered when the Bill was revised.

Efforts to harmonize the divergent views were not immediately successful; partisan politics entered the picture; action was stalled; and it became evident that hope for the enactment of the Page Bill must be abandoned, at least for that session. "The attention of the Congress shifted to the Smith-Lever Agricultural Extension Bill," which was signed by President Woodrow Wilson, in June, 1914.

Commission on National Aid

As so often happens in Washington when the advocates of a course of action are unable to agree on a program, the forces interested in federal legislation were able to unite in a demand for an "investigation." On January 20, 1914, the Congress approved an act calling for the creation of a commission of nine members "to consider the subject of national aid for vocational education and report their findings and recommendations not later than June 1." The bill provided for a bipartisan commission, and the following persons were appointed by President Wilson:

Senator Hoke Smith, Georgia, and Representative Dudley M. Hughes, Georgia, representing the majority Democratic party.

Senator Carroll S. Page, Vermont, and Representative Simeon D. Fess, representing the minority Republican party.

John A. Lapp, director of the Indiana bureau of legislative information, Indianapolis, and Secretary of the Indiana commission on industrial and agricultural education.

Miss Florence M. Marshall, director of the Manhattan Trade School for Girls, New York, and former member of the Massachusetts factory inspection commission.

Miss Agnes Nestor, president of the International Glove Workers' Union, Chicago, and member of the committee on industrial education of the American Federation of Labor.

Charles A. Prosser, secretary of the National Society for the Promotion of Industrial Education, New York.

Charles H. Winslow, special agent, U. S. Bureau of Labor Statistics, Washington, D. C., and member of the Massachusetts commission on industrial education, 1906–09.

The members of the Commission met in Washington, and organized on April 2, 1914, by electing Senator Hoke Smith as chairman. On April 17, Ernest A. Wreidt, director of the Public Education Association, New York, was appointed secretary. An office and statistical staff of 45 persons assisted in the work.

On June 1, 1914, the Commission made its report to the Congress, after six weeks of strenuous activity that included a number of public hearings, conferences with representatives of all interested departments and bureaus of the Federal Government, examination of the results yielded by questionnaires, as well as independent study and research. The report was issued from the Government Printing Office in August, 1914, as H. Doc. No. 1004, in two volumes: I. Report of the Commission, with text of the proposed law; II. reports of the hearings held by the Commission.

Hoke Smith

Discussion of the work of the Commission and of the details of the proposed legislation must be deferred for the present. It remains now to comment briefly on the authors of the Smith-Hughes Vocational Education Act, which provides the foundation upon which the nationwide program of vocational education of less than college grade is carried on today.

Hoke Smith was born in Newton, N. C., September 2, 1855,

and died at his home in Atlanta, Ga., November 27, 1931.

He did not have the advantages of a college education, and did not graduate from high school, but was educated at home by his father. From North Carolina the family moved to Georgia in 1872. The next year, 1873, at the age of 18 years, the young man was admitted to the bar, and practiced law in Atlanta from 1873 to 1893, and from 1896 to 1907.

He was owner and manager of the *Atlanta Journal*, one of the influential daily newspapers in the south, from 1887 to 1896. In 1882, he was a delegate to the Georgia State Democratic Convention, and in 1892, he was a delegate to the Democratic National Convention.

His interest in civic affairs is suggested by his service as president of the Young Men's Library, Atlanta, from 1881 to 1883, and as president of the Board of Education, Atlanta, from 1896 to 1907.

He served as Secretary of the Department of the Interior in the cabinet of President Grover Cleveland, from 1893 to 1896. He also served one term as governor of Georgia, 1907–09. He represented Georgia in the U. S. Senate from 1911 to 1921, and later practiced law in Atlanta.

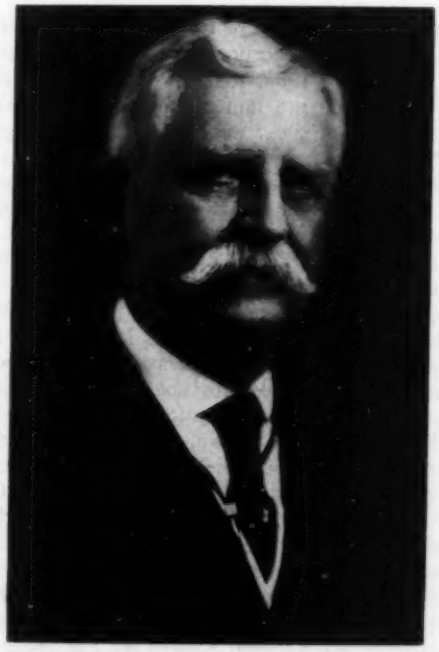
Because of his prominence in the Senate and in national politics, and his service as chairman of the Commission on National Aid to Vocational Education, he was chosen to sponsor the proposed new legislation in the Senate. I find little evidence that he played a definitive part in the drafting of the law that bears his name, or even in the progress of the law through the machinery of the Congress, although his was doubtless a potent influence behind the scenes.

During the period from the date when the report of the Commission was published, August, 1914, to the date when the law was signed by President Wilson, February, 1917, I was in attendance in the visitors' galleries in the Senate and the House on a number of occasions when the Smith-Hughes Bill was up for debate. Several times I saw Senator Smith and Representative Hughes on the floor, but I do not recall that either took a prominent part in the discussion.

My most vivid recollections of these visits relate to the occasions when Representative Simeon D. Fess (1861–1936), of Ohio, held the floor in the House as vice-chairman and later chairman of the Committee on Education. Although a representative of the minority party, he was responsible for piloting the proposed legislation through the give-and-take of parliamentary procedure. This responsibility was his by common consent, in recognition of his thorough professional preparation, his years of service as a college professor of history, head of a College of Law, and his achievements as president of Antioch College, Yellow Springs, Ohio.

I remember one occasion when the bill was under discussion in the House, and the particular question was as to the meaning of "trade education" in the language of the bill. Several members argued that "trade" means the sale or exchange of commodities, and hence "trade education" means essentially the same as "commercial education" or "business education." Since the latter was treated in another section of the bill, the inquirers wanted to know the reason for the confusion caused by injecting it again in the section on education for workers in the manufacturing industries. Dr. Fess, a classical scholar himself, and not too well versed in the technical terminology of the new type of education he was supposed to represent in the debate, experienced some difficulty in meeting the objections of the critics. He told the House that surely everyone understands what a "trade school" is, and that there need be no confusion as to the meaning of "trade education." But the questioners were not satisfied, and discussion on this issue waged back and forth for at least a quarter of an hour. When, finally, the Speaker announced the next order of business, Dr. Fess promised to have a solution of the difficulty the next time the bill was before the House.

In reporting the incident the newspapers announced that Dr. Fess and the Committee on Education, after consultation with the sponsors of the bill, had decided to insert the term, "industrial education," to replace "trade education." The person who was charged with making the necessary change in the text inserted "industrial" without striking out "trade," and when the proofs came back from the Government Printing Office, the phrase read, "trade and industrial education." No one caught the awkward expression until after the act had been passed by both houses and signed by President Wilson. And so, through the years, we have been promoting "trade and industrial education," when a simpler term would have served the purpose.



Dudley Mays Hughes

In conclusion, to return to the personal characteristics of Senator Hoke Smith, it is to be noted that he was a large man physically, well above average in height, and weighing well over 200 pounds. As I observed him, he was quiet and deliberate in his movements and actions. As previously pointed out, I have no recollection of hearing him in debate in the Senate, and I find no references to special oratorical attainments, although it is reasonable to assume that years of experience as an attorney, and the prominent positions held in public life for so many years, must have afforded opportunity for the cultivation of considerable force as a speaker.

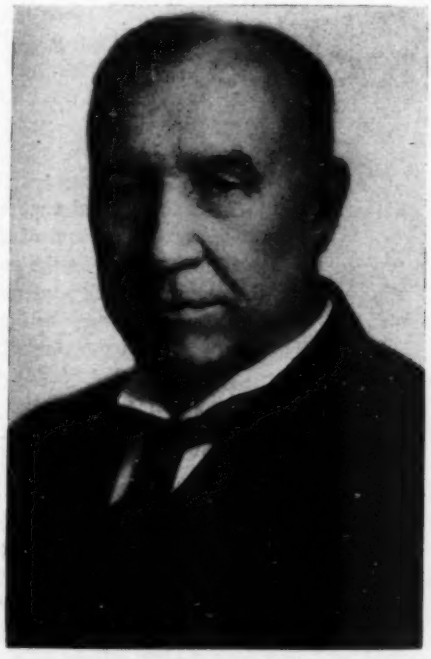
Dudley Mays Hughes

Dudley M. Hughes, coauthor with Hoke Smith of the federal vocational education law which bears their names, was a native of Georgia, having been born at Jeffersonville in that state, October 10, 1848. He died at his home in Danville, Ga., January 20, 1927.

He was enrolled as a student at the University of Georgia, Athens, but did not graduate. He began farming in 1870, at the age of 22 years, and continued throughout the remainder of his life on a large scale, with extensive land holdings.

He was a member of the Georgia State Senate for one term, 1882–83. He served four years, 1904–08, as president of the Georgia State Agricultural Society. In 1904, he was commissioner general for the state of Georgia at the Louisiana Purchase Exposition, St. Louis, Mo.

In 1909, he was elected to the U. S. House of Representatives from Georgia, where he served four terms, until 1917. He was chairman of the Committee on Education of the House for one term, 1915–17.



Hoke Smith

He was one of the original projectors and builders of the Macon, Dublin & Savannah Railroad, serving as president of the company and member of the board of directors.

He was active in public life in various connections, including membership on the board of trustees of the State Normal Institute, in his home town, Danville, Ga. He served for a number of years as a member of the board of trustees of the Georgia Institute of Technology, Atlanta, and of the University of Georgia, Athens. Also, for ten years, he was president of the Georgia State Fruit Growers Association.

Dudley M. Hughes will be remembered primarily as one of the members of the Congress who championed the cause of vocational education, and, in co-operation with his fellow Georgian, Senator Hoke Smith, aided in winning the struggle for the enactment of the National Vocational Education Law.

Influence of Congressional Politics

It is obvious that the active support of influential members of the Congress, in both Senate and House, is essential to the enactment of any but the most routine type of legislation. It is not enough to rely on the merits of any piece of proposed legislation. One important function of congressional supporters is advice given to outside sponsors with reference to the development of sentiment among the lawmakers, both favorable and unfavorable, both in informal conferences and in committee discussions. Invaluable suggestions are given on such matters as the best method of approach to some key member of a committee, with the view to informing him concerning the facts at issue, and convincing him of the necessity and the propriety of action.

The leaders in the old National Society, as its name indicated, were at first interested primarily if not exclusively in promoting a program of industrial education. The forces behind the movement consisted almost exclusively of manufacturers, labor leaders, and a few educators. The active support of educators was assured by including provision for federal subsidies for the preparation of vocational teachers and other workers who would be needed.

After a few years of strenuous effort, congressional sympathizers informed the sponsors that it would be impossible to line up enough votes to pass any such measure as was then contemplated. They were advised to consider broadening the front, and enlisting larger numbers of supporters by appealing to wider interests.

Here is another aspect of the more or less direct influence of the Morrill Land Grant College Act upon legislation for vocational education. Taking their cue from the more than 50 years of experience with the former, the advocates of the latter decided to take the necessary steps to enlist the active support of the agricultural interests. Accordingly, provision for a program of agricultural education was incorporated in the bill, with immediate and favorable results.

It was soon discovered that the addition of these reinforcements was still not enough to turn the scales.

One of the obvious possibilities that had not received any degree of emphasis was a program of commercial education. There were many students of the movement who did not understand what seemed like the neglect of a field of effort that should have enlisted as many supporters as either industrial education or agricultural education, or perhaps both combined. I remember sharing this questioning attitude. When the proposals of the Commission on National Aid to Vocational Education were made public, in 1914, no provision was made for federal grants to the states for the promotion and support of commercial education. I became a member of the staff of the U. S. Office of Education at about that time, and had opportunity to talk with some of the "insiders" among the leaders of the movement, and was told that the omission was caused by the decision not to incur the hostility of the private business college interests, who regarded federal subsidies as a direct threat to the future of their institutions.

At that period private business colleges were to be found in all sections of the United States, including many towns of 20,000 to 30,000 population, and even some smaller ones. These schools were performing a much needed service by cultivating a field that was generally neglected by the public schools. Later, with the widespread introduction in public high schools of typewriting, shorthand, and other business subjects, many private business colleges were forced to close. But in 1915 to 1920 the active opposition of the private business college interests would undoubtedly have been sufficient to block the enactment of federal legislation for vocational education. Years later, when it was decided that the time was ripe, legislation was sought and secured for the promotion of "distributive education."

The final move in the effort to broaden the front, and to strengthen the forces that could be lined up in support of federal legislation, was the decision to include a program of home eco-

nomics and to enlist the active support of the women of the country, beginning with the American Federation of Women's Clubs.

It seems like a strange manifestation of human nature that the organization of such an imposing array of interests should be necessary to bring about legislation for a cause which is so obviously in the public interest. That it is in fact a characteristic facet of the "American way of life" is confirmed by the experience of the past 20 years or more in the effort to secure the enactment of federal legislation for another forward-looking program of public education. Just as we saw it more than 30 years ago, inertia, petty politics, personalities, jealousies, rivalries, and inflexibilities exert sufficient force to overcome the appeals of logic, reason, and the public interest.

Methods of Correlating Related Technology and Shop Practice

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Much has been said about correlating shop and related instruction but little has been done to show how it should and can be done. The three methods usually employed are as follows:

1. Perhaps the best way is to have the same instructor teach both shop and related but one drawback to this method is that very few people are equally competent and qualified for both.

2. The next best way is to have one instructor in the shop and one instructor for the same class in related technology. In this way you can get better related technical instruction as only two instructors need to correlate their teaching.

The related instructor should be well grounded in the occupation which he has to teach, so that he may solve any problems in his trade field that might arise.

Also he should work in industry at least one summer out of every four, in order that he can keep up with the trade. By the same token the shop instructor must be a qualified toolmaker or at least a first class machinist and be able to work in industry at least one summer out of four in order that he will be better able to keep up with all the things that modern manufacturers are incorporating and the trends that are taking place.

3. The third and least effective type of related training is where there is a separate instructor for each of the related subjects. Although this instructor is a specialist in his subject field he does not ordinarily have an adequate trade background. He therefore teaches with a straight old-time academic approach; consequently there is very little if any integration, each of the related subjects being taught independently and without any reference to the other; this certainly does the student a grave injustice as well as the entire vocational program.

I have selected the second method of instruction, in which the shop instructor has the class for three hours and one related instructor has the same class for the related technology. In this type the relative time spent each day is controlled entirely by the functional needs of the trade.

The organization of an integrated course may best be explained by an example, which in this case has been chosen from the machinist trade.

Success of this depends on *Preplanning* and *Correlation* between the shop and related instructor.

So that the plan may function properly, the shop instructor, assisted by the related subject instructor, should plan each and every job which is expected to be done during the school year. After job cards have been prepared by the shop and related instructors, they should be made out in full and checked very carefully by the supervisor. At the end of the first day of school, or as soon as the enrollment of the class permits, each student assignment is listed on a progress and assignment chart. The progress and assignment chart consists of an alphabetical list of students and the dates on which each will be engaged in some block of work assignment by the two instructors.

In order to determine the length of time each student will be working on a certain block of work, it is necessary merely to divide the number of school days, which is usually 180, by the number of students. The results will be the number of days that each student will be at a certain work station or taking part in the operations in a block of work. Samples of a block of work are lathes, milling machine, shaper, shop foreman, tool crib attendant, and other machine operations found in the shop.

It will be found that in most shops it is impossible to use all of the work stations every day of the school term, unless the facilities are very limited. There will be times when the services of some one machine will not be needed on jobs being carried on by the individual pupils.

It is the duty of the related instructor to assist the student in the following ways in order to correlate the work:

1. Make a sketch of the job if a print has not been furnished.

2. Prepare a job plan sheet.

3. Make the mathematical calculations necessary for the job on hand.

4. Determine and study the science applications having to do with the job.

5. Determine and look up information on the materials required.

Both the shop and related instructor must individualize their instruction if such a plan is to function properly. The shop instructor should delegate many of his duties, such as securing tools and equipment and getting out materials, to a student shop foreman. By assigning various routine duties as are set up under a shop personnel system, students receive training in the acceptance of responsibility.

Let us see how this works. A requisition comes to the shop instructor for six live centers. He accepts it because of the training value involved and in his afterschool meeting gives it to the related instructor who (1) makes out a work order, (2) then consults the progress and assignment chart to see what students are scheduled for

1. Lathe work which will be the operation, he then makes out his assignment.

2. Heat-treat for hardening is the next step, again he checks the assignment chart and makes this assignment.

3. Grinding the part, again he checks the assignment chart and makes this assignment.

4. The next step is inspection and assembly (this is benchwork). Again the chart is checked and the assignment made.

When the class in the related room takes up the next day he passes out the assignments to the students (do not wait until students are out of a job, but always have plenty of work ahead). The student foreman is also furnished with a list of the jobs ahead so that he knows what is coming up, as well as the shop and related instructor (this tends to build responsibility in the student). The sequence of operations as assigned should be as follows:

1. Make sketch of live center: (*a*) body, (*b*) center, (*c*) head, (*d*) assembly.
2. Math involved: (*a*) figures the taper, (*b*) tolerance, (*c*) size and number of pieces of steel involved, (*d*) rough and finish size, (*e*) amount to leave for grinding.
3. Science: (*a*) type of steel, (*b*) what pieces to harden; (*c*) how hard — Rockwell, (*d*) r.p.m. to use, (*e*) feed, (*f*) what make and number of thrust bearing, (*g*) what make and number of radial bearing, (*h*) job sheet: (1) tools, (2) safety, (3) equipment, (4) sequence of operation.

The student should have at least two days in which to prepare the foregoing before he is scheduled to start the actual manipulative work in the shop.

By following the given outline the student should be prepared for his work when he enters the shop.

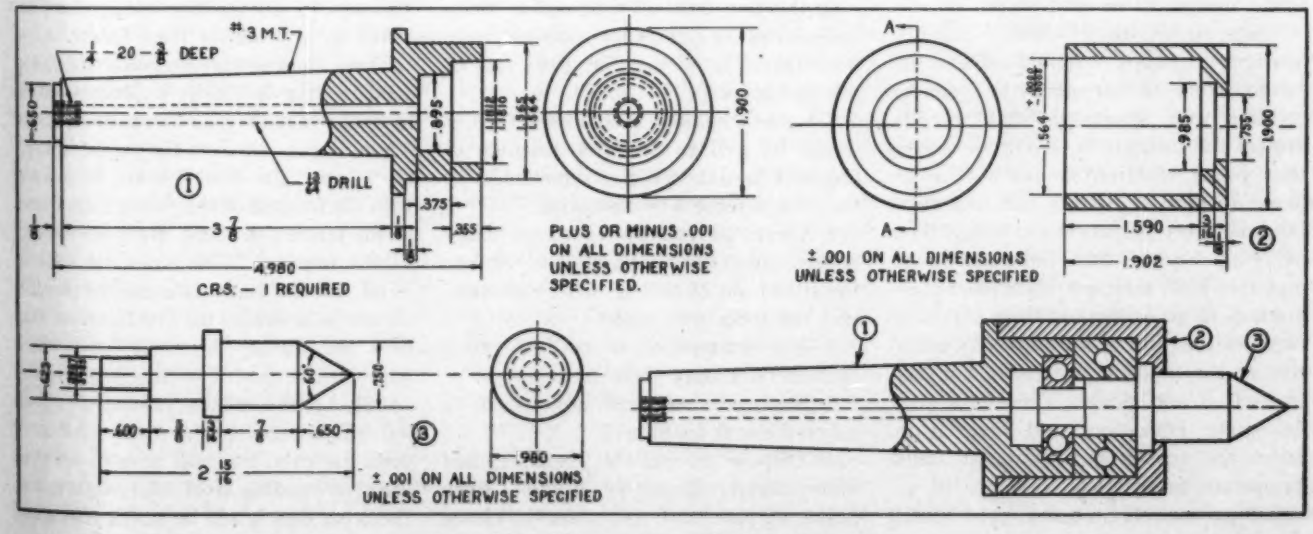
The shop instructor should carry a small notebook with him at all times so that whenever any student does not have the proper related work done he can make a note of it. These notes can be given to the related instructor at their daily meeting in order that he can help those students who are having trouble with their related work.

When this is carried out it will allow the shop instructor more time to do the instruction and supervision that he is supposed to do, which will in turn produce a much better class of student as they will be so much better informed on both the related and manipulative work than they have been in the past.

Employers will be quick to recognize this improvement in their new employees (our students) which will create a greater demand for our products (students). It will also cause the vocational schools to be put in a very favorable light when more money is needed for replacement and expansion.

There seems to be a mistaken notion that vocational schools are for the poorer type of student. This is a grave mistake, as the trades are not the easiest courses, but the half time spent in the shop gives the student that is not able to express himself quite so well on paper an excellent chance to express himself through manipulative work. Some of our best men of today were never able to write fluently but have expressed their thoughts by doing. The vocational instructor is sometimes looked down on because of his failure to possess a college degree. Trade experience is the first requisite for certification. It should be noted that 58 per cent of the vocational instructors in Ohio have college degrees. Considering that they have all served four years' apprenticeship plus their other trade experience gives them a much broader view of what the community and the country expects of high school graduates to make them the leaders of tomorrow in their trade. The students should be taught not just the mathematics, blueprint reading, drawing, and sketching they en-

(Continued on page 176)



Assembly of live center with thrust bearing

Industrial Arts and Vocational Education

John J. Metz, *Editor*

THE CRIPPLED CHILD

The 1951 Easter Seal Campaign ends on March 25. That, however, should not deter us from doing our utmost to continue to help the millions of American crippled children for the rest of the year so that they may grow up to lead happy and useful lives.

Every teacher ought to read the article, "A Practical Approach to Accident Prevention" by Harry F. Dietrich, M.D., in the February, 1951, issue of *The Crippled Child*. In this article Dr. Dietrich points out that while many of these little sufferers have been incapacitated by polio, arthritis, rheumatic heart disease, cerebral palsy, and congenital causes, there are still large numbers who owe their inability to live like other happy youngsters to the fact that they have been crippled by preventable accidents which have caused very serious if not permanent injury to the children.

Dr. Dietrich states that accidents cause about 12,000 children to lose their lives annually, while 30,000 to 50,000 are permanently injured.

Figures like these ought to make every one of us resolve to do something about helping these youngsters, not only after they have sustained injury but to avoid being injured in the first place.

That means that adults — parents, teachers, grownups — should make a concerted effort to surround the younger children with safeguards that actually protect the youngsters. Everyone knows that young children should not be allowed to play on streets and highways, but how many parents see to it that their offspring obey this rule? How many communities have sufficient supervised playgrounds to accommodate their children?

All of this, of course, only calls attention to the need of protection, but that in itself is not enough. There also must be safety education, and here again, home, and school, and community must co-operate to see that this type of accident prevention is offered, not in small doses but continually.

Accident education and prevention have done much for the industrial worker. It is high time that more time and effort be expended to reduce the frightful numbers of accidental deaths and permanent injuries to our children.

And while we are thinking about the Easter Seal Campaign, can we not use it to emphasize the need for helping our students to become more altruistic?

It is not difficult to arouse sympathy where the suffering of small children enters into the picture. Why not make use of this in making the classroom participate in the Easter seal campaign as a class project. This would have a good effect on the students and would result in giving more financial aid to a cause that deserves our assistance.

PREPAREDNESS

The National Board of Fire Underwriters calls attention to the necessity of fireproofing homes as an aid to counteracting and minimizing the results of impending enemy bombing.

The Civil Defense Administration issued a statement that an A-bomb would cause complete devastation within approximately a half-mile radius of the explosion. For two miles around, there would be a radiation of heat great enough to start many fires that might easily get out of control.

Up to five miles beyond this area, fires might start from dislocated heating appliances, such as chimneys, flues, furnaces, and the like, that may be tipped over from the jolt of the bomb explosion.

In this five- to eight-mile radius, then, unless advance emergency measures have been taken, there may be great loss of life and property.

To guard against such losses then it would be well to follow a schedule of fireproof housekeeping recommended by the civil defense administration.

1. Clean all rubbish (such as newspapers, magazines, old clothes, broken furniture) out of closets, attic, basement, and out-of-the-way nooks.

2. Put wastepaper in covered metal containers. Empty these frequently.

3. Keep oily rags and paint cloths in covered metal containers.

4. Dispose of gasoline, benzine, and other highly flammable liquids. Keep paint, varnish, and turpentine in closed containers and in a cool place.

Suggestions of this kind can be taken up readily, as group projects with shop students. The students can be shown what must be done at the school, and from that experience, learn fairly well what should be done in their own homes.

DO YOUR STUDENTS READ?

Have your students trouble in following their instruction sheets? What seems to be the reason for this? Are the instruction sheets written so that the language is on the reading level of the students, or do the pupils have trouble in translating the printed word into actions?

It may not be amiss to have a short reading exercise in the shop with every class so as to clear up some of the troubles that certain students may have. This may be done in connection with the demonstrations that are given to introduce certain operations. Have a student read the direction given before the teacher shows how each operation is performed. In this way the students who have trouble in reading the lesson sheets, will gradually become accustomed to connect the English with the action which it is supposed to describe.

Interest in reading may be further aroused by having good reference books available in the shop. It is not enough, however, to have these books on a shelf unless frequent attention is called to them. See that the books are used. See also that there are books about occupations on your shelves. The vocational guidance value of your work can be strongly high-lighted by getting your students to do reading of portions selected by you, out of these books.

Then, too, you may do much to develop good reading habits by calling attention to books that may be obtained from the school library, or from the public library. Of course, the books must be chosen with the interest of the young rather than of the teacher in mind. Boys have many varied interests. This must be kept in mind, and as many interests as possible should be appealed to. The librarian may help the teacher to select titles which may then be posted on the shop bulletin board. Again, the mere posting of a book list will not change the reading habits of your students. You will have to sell your ideas on reading from one year's end to the other, but it will be worth your effort to yourself as well as to the students.

Reducing Motor Difficulties

C. T. BAKER
Consulting Engineer
Atlanta, Ga.

Whether we are willing to admit it or not, the grim fact remains that the effects of the current conflict in Korea will be felt in the United States in many ways and in many fields of endeavor. Regardless of opinions to the contrary, every place that consumes electricity to operate equipment, burns fuel to produce steam, hot water, or warm air, is going to feel the effects of high prices, long deliveries, interruption of plant operations and, possibly, the need for many substitutes for materials now in common use.

Electric motors, pumps, wrought iron and steel pipe, copper and brass products, steam boilers, fans, stokers, etc., have already advanced in selling price and many of the items named are very difficult to obtain even at any price.

Deliveries on boilers, pumps, piping, etc., are stretching well into the future — some items well into 1951. The writer can attest to this because he is asking for bids and guaranteed shipping dates on many items needed to make up heating plants, boiler plants, air conditioning plants, and other installations.

Now, what do these things suggest? First of all, that all users of equipment of whatever character must maintain it in A-1 condition at all times and secondly, all equipment must be protected from damage due to any cause.

Electric motors are becoming increasingly difficult to obtain. At the present time, motors of from two to fifty horsepower cannot be secured in less than 16 to 18 weeks. This condition will become worse as the year 1951 advances. It is obvious, therefore, that if a user allows his motor equipment to become damaged beyond repair or destroyed by fire as a result of grounds, short circuits or other causes, his chances of securing a new one in time to prevent a long shutdown are indeed slight.

The following suggestions are offered to school plant engineers and plant maintenance men as a guide to a better understanding of the problem of the care and maintenance of electric motors and accessories.

What Causes Motors to Burn Out

The useful life of an electric motor is governed by various factors — the character of service to which the motor is applied, the care it receives, and, to a considerable extent, its location and supporting foundations. In general, it may be stated that the life expectancy of a motor is proportionate to the life of the insulation of the windings, both rotating and stationary, which is an integral part of all motors.

There are several agencies that cause insulation to break down and ultimately fail, three of the most destructive being heat, moisture, and oil. Heating of motor windings results from high ambient temperatures, overloading, poor ventilation, hot bearings, unbalanced phases, low voltage at the motor terminals, etc.

Moisture comes from the air of the room and is particularly bad where motors are idle for considerable periods in an atmosphere of high humidity.

Oil usually comes from overflowing shaft bearings, for which there is no excuse except ignorance, carelessness, and indifference.

Naturally, some heat, as found in the windings of motors, is the result of inherent losses, a common condition of all motors, but, where ventilation is adequate, heating from this source is never troublesome. Heat, at high temperature levels, as it frequently exists in electric motors, due to one or more of the causes mentioned, produces deterioration in the insulation by reason of the carbonizing of the materials of the insulation, such as varnished cloth, paper, oiled line, insulating varnish, fiber, etc. As carbonizing progresses, the insulation approaches the point of failure and, ultimately, there occurs a burnout, followed by an interruption of service. Still another bad product of heating of motor windings, is lowered efficiency and increased power consumption. As a matter of fact, motor efficiency decreases sharply after the scale of temperature has reached a certain point on the windings. When this happens, power bills go up. This all points to the necessity for motor users to give attention to maintenance. Keep oil from reaching the windings via the careless operator with an oil can — the combination of these two means overflowing bearings and oil impregnated insulation which won't be long for this world.

Moisture is often a serious problem insofar as motor operating and maintenance are concerned. Air, highly saturated with moisture, coming in direct contact with temporarily idle motors that have cooled below the dew point of the air, will deposit much of its moisture, not only on the insulation but on the frame and shaft, the motor starters, and other parts subject to contact with moisture laden air.

Motors idle for even short periods should be covered with waterproof canvas or other material which will effectually protect them against moisture. Motors that are not used regularly, but just occasionally, should be covered and equipped with an electric light of about 200-watt capacity which, when placed at some suitable point underneath the canvas, will give off sufficient heat to keep the temperature of the motor above the dew point of the surrounding air. A vent opening must, of course, be placed in the highest point in the covering, and a similar opening near the bottom, fairly close to the light, in order to induce sufficient air movement to insure that the moisture beneath the canvas will be carried out as it is liberated within the enclosure. This is a very important precaution against severe damage to motors that must stand idle for a considerable length of time.

The fact should not be overlooked that oil and moisture which collects in the windings of electric motors, acts as a solvent and hastens the day of complete breakdown of the insulation.

Cleaning

All motors, regardless of size or type, should be blown out with compressed air,

five to seven pounds pressure, to remove loose dirt, lint, etc., from the windings. Do not use high pressure air, since to do so will cause the moisture it contains to be blown into inaccessible places where, in time, it will damage the insulation and metal parts. High pressure air may also cause mechanical damage to the coils by disturbing their permanent setting.

Chemical Cleaning: Motor windings may be sponged with benzine, gasoline, or carbon tetrachloride to remove oil and grease. This is often very effective. A mixture of 50–60 per cent carbon tetrachloride and 40–50 per cent gasoline is noninflammable, but the resulting vapors, when mixed with the correct quantity of atmospheric air, are explosive. Therefore, all such cleaning should be performed in a well-ventilated room.

Carbon tetrachloride itself should never be permitted to come in contact with rubber insulation; such as the rubber insulation on the wire leads coming from the motor coils to the outside of the frame of the motor, for example.

Motors cannot properly be cleaned without removing the rotor from the frame, so as to make the stator coils, as well as the rotor winding, accessible for cleaning and for later drying out in a heating oven to remove all traces of cleaning fluid. In many industrial plants the conditions of service are such that motors must be cleaned by this method about once a year. After each such cleaning, the windings should be given a coat or two of insulating varnish to fill up all cracks or openings, so as to prevent dirt from working into them later and causing trouble.

Motor Bearings: Many of the troubles to which electric motors are heir are the direct result of excessive bearing wear, caused by the use of the improper oil. Sometimes the oil used contains dirt or other abrasive materials which consequently effect no end of trouble.

Excessive bearing wear is the inevitable result of improper and inadequate lubrication. Bearings should be inspected regularly and the ends kept sealed against the suction effect of the revolving rotors, which action tends to pull oil out of the bearings along the shaft into the windings.

Experience has taught that much of the trouble which develops in electric motors, frequently causing them to burn out, can be avoided by intelligent attention, which should include periodic inspection, at least yearly cleaning of equipment subjected to oil and dust, plus the keeping of a complete record of the dates on which the motor was serviced and what was done to it at any particular time.

Motors represent a considerable investment in many school plants, and their period of usefulness depends upon the attention they receive, which means that the owner's investment is protected only by an approved maintenance program.

Wiring Flaws: About two years ago, this writer made an engineering report of an industrial plant that he was asked to survey. Because this investigation disclosed some information that should be of assistance to those in charge of the electrical and mechanical equipment of schools, the following paragraphs from the report are reproduced here:

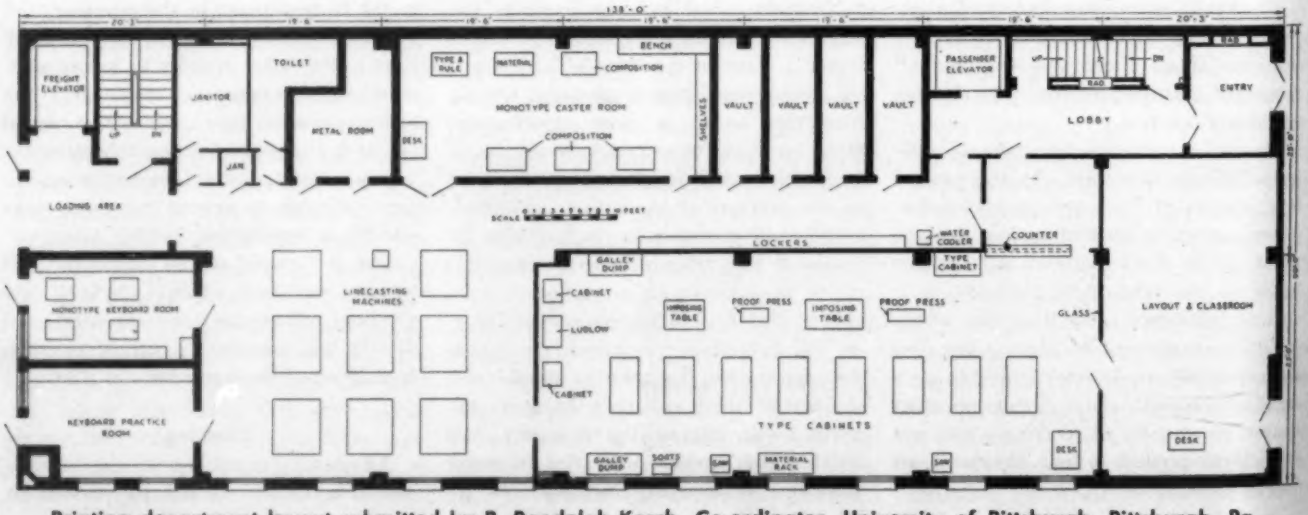
"A careful inspection of the wiring throughout the building discloses much needed in the way of repairs and replacements.

"Metal boxes enclosing heavy, large capacity switches and fuses are in many instances so wired as to prevent the closing of the door of the metal containers. In consequence of this, the fuses, switches, and bare connections are exposed to the destructive influences of steam vapors, moisture, etc.

"It was found also that none of the electric motor frames, switch boxes, conduits, and other equipment had been grounded. This represents a very serious situation and one that can, and often does, result in personal injury and even death.

"There was also found in use, many lamp cords (some of which are not long for this world) wrapped around bare water lines and otherwise used in a way to cause fuse blowouts and other trouble."

The writer cannot urge too strongly that all who have authority or who are responsible for the operation and maintenance of the mechanical, electrical, and steam equipment in school plants to take immediate steps to investigate such equipment in order to put their houses in order before it is too late. For many, it is "later than you think!"



Printing department layout submitted by R. Randolph Karch, Co-ordinator, University of Pittsburgh, Pittsburgh, Pa.

PROBLEMS AND PROJECTS

REVERSING SWITCH

JOSEPH J. LUKOWITZ
Milwaukee, Wis.

The boy-appealing reversing switch, shown in Figure 1, may be made quite easily by the interested junior high school student. Boys who have constructed an electric motor are eager to make this switch so that they can reverse their motors by simply pushing the control lever to the right or left. The motor can be stopped by putting the lever in the vertical position.

This switch makes an excellent complement for the Toy Electric Motor and Countershaft which was described on page 320 in the October, 1949, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine. An electric motor such as this, complete with a reversing switch, when taken home by the boys does vastly more than bell wiring or similar work to build good public relations. Besides this, the reversing switch offers numerous teaching and learning situations involved in its construction.

No critical or difficult to obtain material is required for this project. Because tin is used the inference is not to be made that the project is a poor substitute, a makeshift. The contrary is true. The switch operates perfectly and the motor is tops in performance and power.

Figure 2 shows the details of the switch body and the location of the fixed contacts

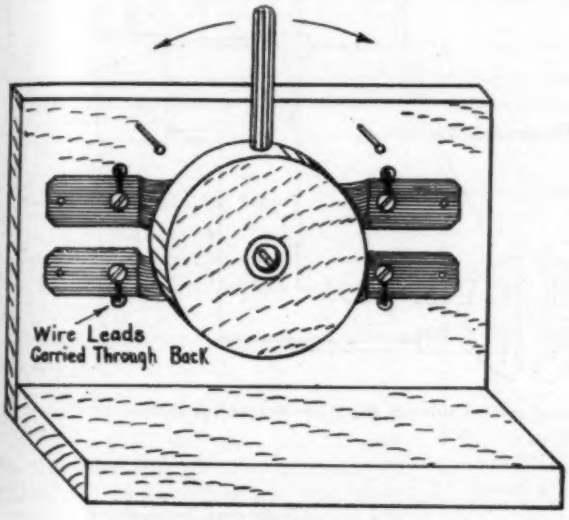


Fig. 1. Reversing switch

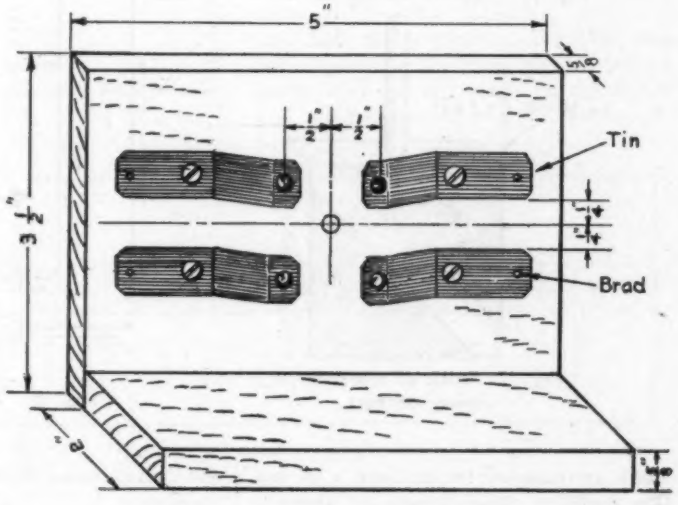


Fig. 2. Location of fixed contacts

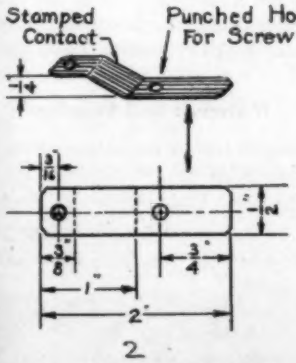


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Fig. 3. Fixed contacts. Four required. Tin

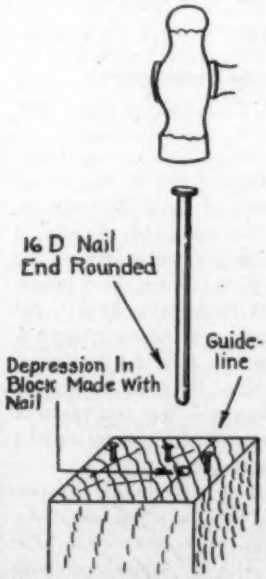

Fig. 4. Block for forming bead on fixed contacts

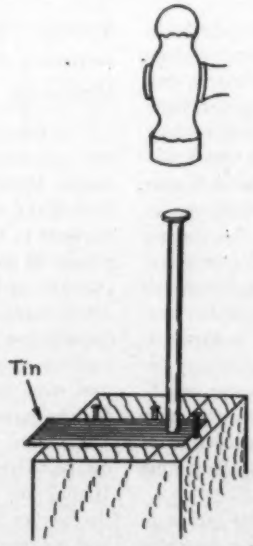

Fig. 5. Bead-forming block in use

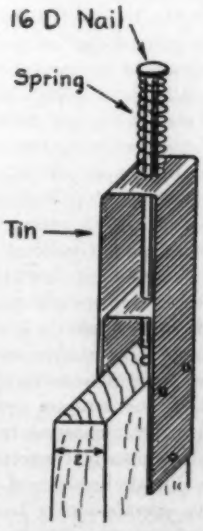

Fig. 6. Another bead-forming jig

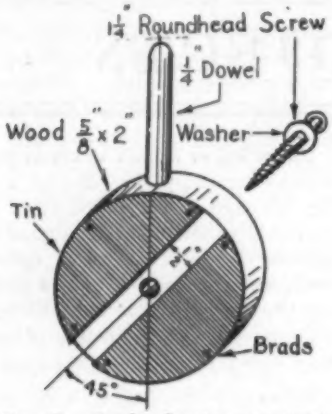

Fig. 7. Back of rotary contact

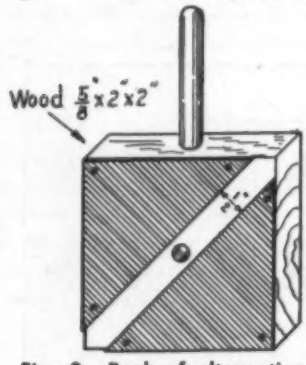

Fig. 8. Back of alternative rotary contact

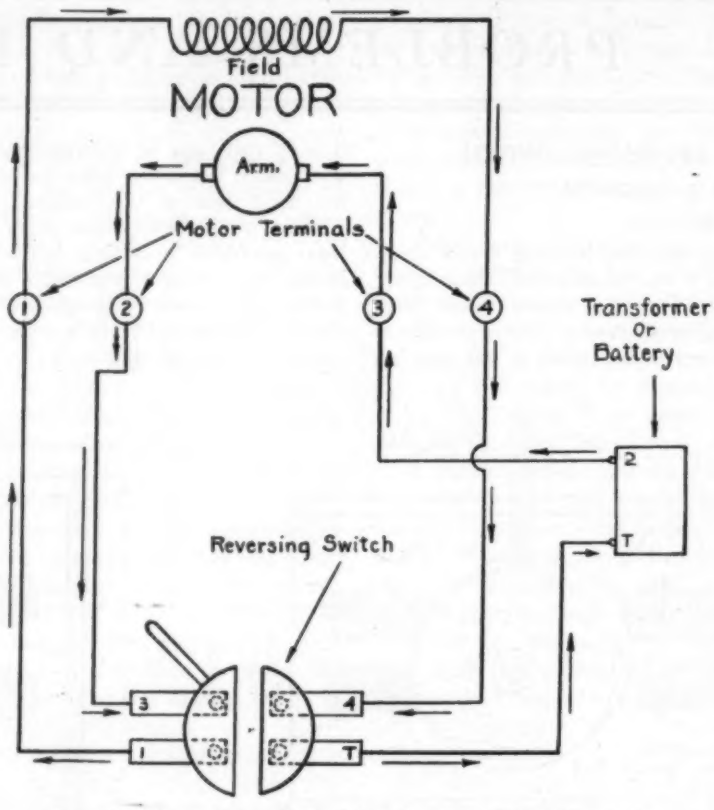

Fig. 9. Reversing switch wiring diagram for series motor

which are made of tin cut from a tin can. The details of these contacts are shown in Figure 3. Figures 4 and 5 show a very simple method of forming a nicely rounded bead on the fixed contacts. Figure 6 illustrates a little more elaborate but still simply constructed bead forming jig.

Figure 7 shows the rotary contact details. The straight edge on each of these two contacts should be beveled with a file and then smoothed with emery cloth so that the beads will slide easily over the edges. These contacts are simply nailed to the wood disk with brads. A square rotary contact, as shown in Figure 8, could be substituted for the round one.

Figure 9 is a wiring diagram for the reversing switch connected to a series motor. If the field terminals and the armature terminals of the motor are connected to separate terminals on the motor base, as shown in Figure 9, the boys can readily connect the motor for operation with or without the reversing switch. Using four separate terminals in this way will make it unnecessary to disconnect wires from permanent connections thus eliminating the ultimate breakage of wire.

To operate such a four terminal motor as a series motor without a reversing switch it is merely necessary to connect a jumper, a short piece of wire, across points 1 and 2, and connect points 3 and 4 to a battery or transformer.

FORGING PROJECTS

E. R. GLAZENER

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Arkansas A. & M. College

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The forging projects shown in this article are reasonably simple in design and easy to make. However, this group of projects is both useful and appealing, particularly to the students in the rural or farming communities, where the gate hook combination, chisels, and punches, and hammers are frequently needed. These three groups also give the student an introduction to some of the main forging operations, the working and heat treatment of tool steel, and the making of useful articles for the home or school shop.

A varied amount of technical information can be offered along with the actual operations. If they are made in the sequence given here, the worker begins with the simple operations and progresses toward the more complicated. A number of hand tools are used and the projects fit in nicely in a general shop.

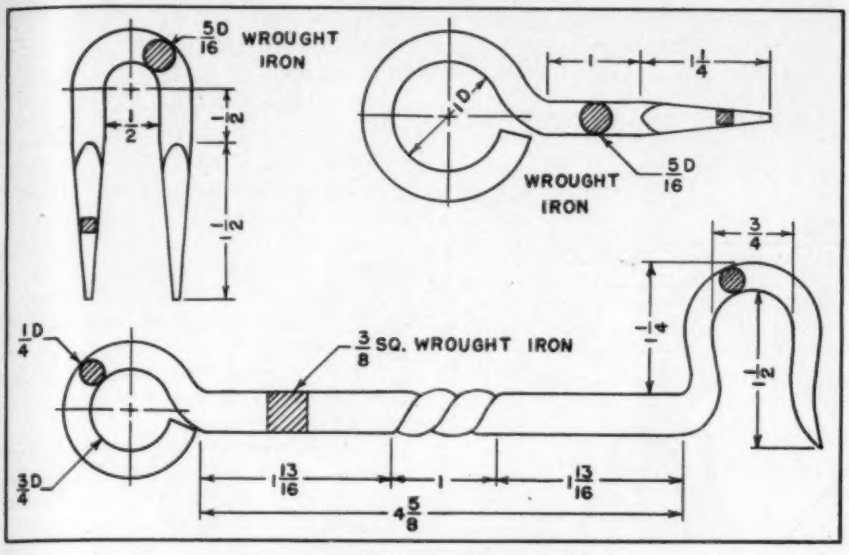
Tools and Equipment

Furnace or forge, assorted tongs, assorted hammers, and punches, assorted files, anvil, hardy, cold chisel, hot cutter, flatter, steel rule, center punch, bench and/or belt grinder, blowtorch, goggles or shield, machinist vise.

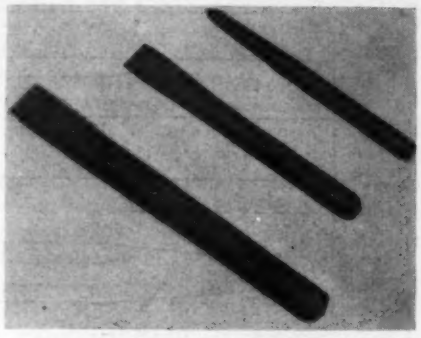
Materials and Supplies

Blacksmith coal or gas furnace, lime, emery cloth, linseed oil.

No. of pcs.	*Name*	*Size*
1	Wrought iron (staple)	5/16 dia. x 3¾ or 4 in.
1	Wrought iron (hook spike)	5/16 dia. x 5⅝ in.
1	Wrought iron (gate hook)	⅜ sq. x 8 in. x ¼ or 5/16 dia.
	Wrought iron may be substituted without twisting	
1	Tool steel (center punch)	5/16 x 4½ hex. or oct.
1	Tool steel (cold chisel)	⅜ to ⅝ x 5½ in.
1	Tool steel (double end hammer)	1 in sq. x 4¼ in.
1	Tool steel (cross-peen hammer)	1 in. sq. x 3¾ in.



Details of staple, hook spike, gate hook



Center punch and cold chisel

Procedure for Staple

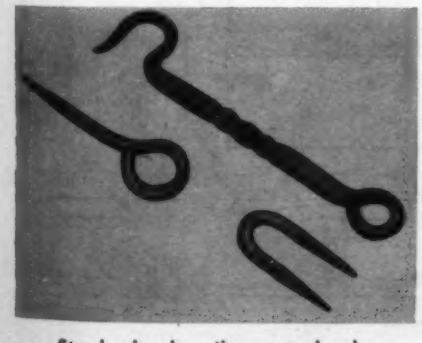
1. Cut 5/16-in. diameter stock to given length by using cold chisel and hammer.
2. Draw out and shape ends on face of anvil as shown.
3. Bend to required shape on anvil horn and cool in water.

Procedure for Hook Spike

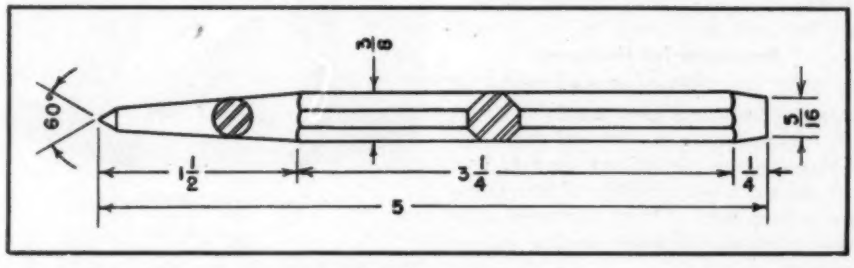
1. Cut 5/16-in. diameter stock to given length by using some method not used for the staple; such as, cutting with a cold cutter.
2. Draw out and face one end on the face of the anvil.
3. Bend the eye to the required circular shape on the horn of the anvil and cool in water. If the worker has had previous experience, it may be desired to forge weld the end of the eye to the spike body. This may prove difficult when using wrought iron but can be done with some success.

Procedure for Gate Hook

1. Cut 3/8-in. square stock to given length by heating and using a hardy.
2. Draw out hook and eye ends to given size and length. If the tip ends split slightly, they should be cut off for best final results.
3. Bend these ends, where the round and square parts meet, in opposite directions and at a 90-degree angle with the square body. Form the desired shape, beginning near the right angle bend.
4. Measure the center portion to be twisted, mark, heat, and twist by clamping one end in a vise and using tongs on the other end. The vise and tongs should be clamped at the end of the section to be twisted. (If the eye of the hook is to be as shown in the drawing, the twist must be one half turn or one and one half, etc. If one or two turns is desired the ends in step three must be bent in the same direction to make the end of the eye meet the body on the bottom side as shown.)
5. Straighten and cool in water.



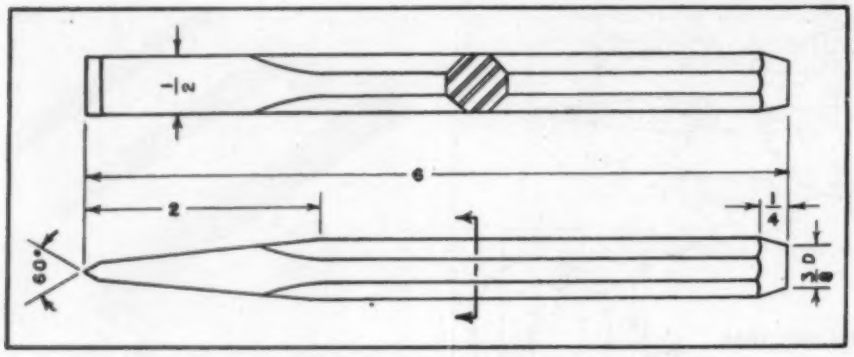
Staple, hook spike, gate hook



Details of center punch

Procedure for Center Punch

1. Heat 5/16-in. hexagonal or octagonal tool steel and cut stock to length by using a hardy or hot cutter. Heat slowly. Most steel for tools of this nature can be cut and worked properly at a cherry or bright red heat but can be quickly and easily overheated.
2. Draw out one end to desired length and size. Improper heating and working frequently shows up only after tempering.
3. Heat entire punch as suggested and anneal by placing in a metal container holding lime or other annealing media. Let punch cool until it can be handled with bare hands comfortably.
4. Remove from lime, then file, grind, and polish to desired shape.
5. Place the punch inside a piece of pipe and heat to a cherry or bright red heat. Cool about one half the length of the punch in a tempering media; such as, oil, cool water, or slightly briny water. (Do not cool abruptly, but plunge in and remove several times to obtain dark color on point end, leaving opposite end hot.) Remove and polish a part of the point end with a piece of emery cloth tacked to a small piece of wood to prevent burns. As the heat from the hot end gradually progresses toward the point, a succession of colors appear. When the brownish color reaches the point, dash the entire punch into the tempering media. Move about continuously until cool or air bubbles will form on the punch and prevent proper tempering. Cooling at this color makes the punch hard enough for all practical purposes.
6. If a black finish is desired, also helping prevent rust, apply a thin coat of linseed oil and burn dry thoroughly in the furnace, over the forge fire, or with a blowtorch. Care must be taken to prevent overheating and removing the temper.



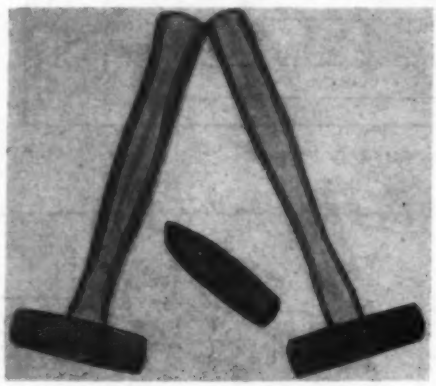
Details of cold chisel

Procedure for Cold Chisel

Heat ⅜-in., ½-in., or other size hexagonal or octagonal tool steel as for the punch and cut to given length. Follow the same general procedure as for the punch. However, greater care must be taken in heating larger stock evenly all through without overheating the outside.

Procedure for Hammers

1. Heat 1-in. square tool steel slowly but thoroughly and cut to given length.
2. Measure center of stock and punch hole of suggested size one-half way through. Turn over and punch out remainder of hole, taking care to keep sides of stock hammered in to prevent bulging. Repeated heating will be necessary.
3. Smooth hole with drift punch, heat and anneal as for punch and chisel. (If a cross or straight peen hammer is to be made, one end should be drawn out to rough shape and size before annealing.)
4. Grind, file, and smooth the hammer, including the hole, to the finished size.
5. Each end of the hammer may be tempered to the desired hardness in the same general manner as was used for the punch and chisel, but heat only about 2/3 of the total length of the hammer in using this method.



Various types of hammers

This will leave the eye slightly softer than the ends. However, successful results can be obtained by using the correct amount of heat in tempering the complete hammer at one time.

6. The same type of black finish can be applied with care as explained previously. A handle can be bought or made and fitted to the hammer head. An added minor forging project would be the making of a wedge for the handle. This may be made of a small piece of scrap. Notching this wedge with the cold chisel will help hold it in the handle when driven in. Designing and making the handle will work in well in the woods section of a general shop.

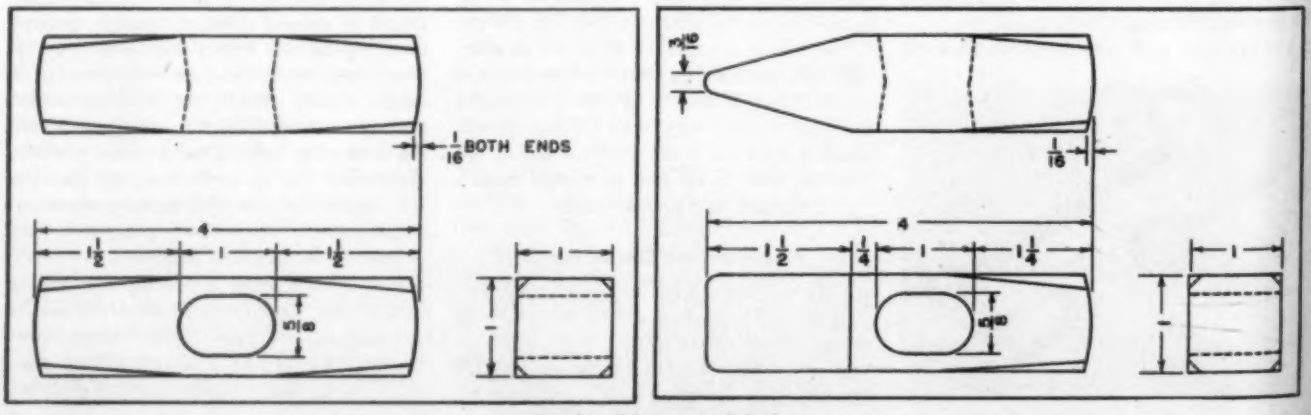
Safety Precautions

1. Keep hot and cold metal scraps clear of passageways where there is danger of someone handling or walking on them.
2. Be sure the ends of metal are cool before replacing in the racks.
3. Keep tools cool when using them on hot metal by frequent emersion in cool water.
4. Never use or let tools acquire mushroomed heads.
5. Hold all tools firmly, especially cutting tools held by hand and make solid blows when hammering or cutting.
6. Always wear a shield or goggles when grinding, even though the grinder is supplied with protector shields. This gives double protection.
7. Keep your mind on the job and hold material firmly when grinding.
8. Do not over- or underheat your material.
9. If using coal and a forge, keep a clean fire by removing clinkers occasionally.
10. Stand in a comfortable position and use a free arm motion when hammering.
11. Be sure tools and materials are cool when picking them up with bare hands.

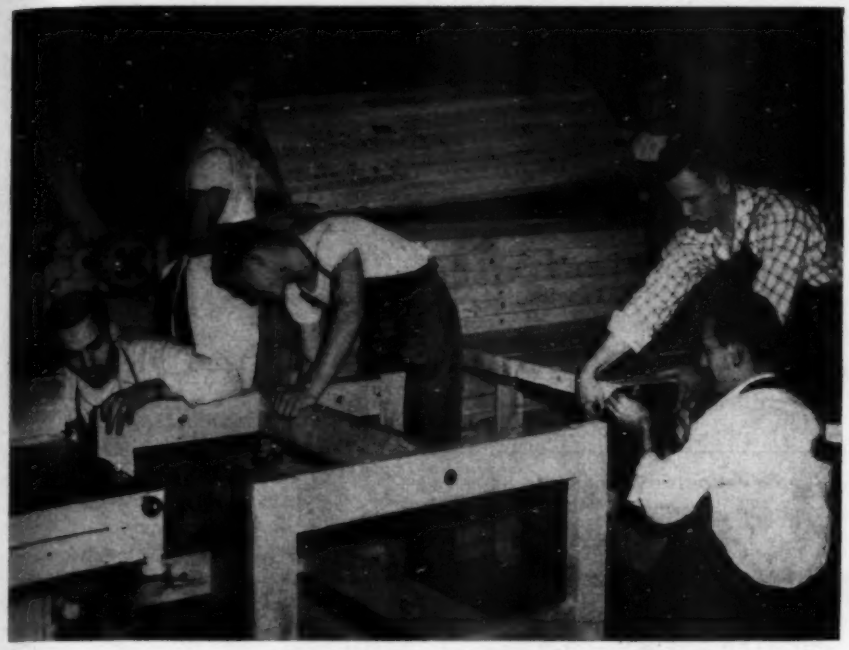
STUDENT BUILT WORKBENCHES

M. J. RULEY
Director, Industrial Arts and Vocational Education
Tulsa, Okla.

Twelve workbenches were needed for the new shop at Grover Cleveland Junior High School. The firm from which the board of education planned to order the benches said there would be a delay in filling the order. That's where the day trade cabinetmaking class stepped in and saved the day! Material was ordered for the benches. Instructor E. L. Southard put his class on a production line



Details of hammer heads



Building the four-student workbench

basis. A crew under a lead man was assigned to each phase of the work. Students took turns working in each crew so that they would learn to perform the various operations.

The benches were designed to accommodate four students at each bench.

The day trade class members worked three hours each morning, and attended related classes the rest of the day. This is one of the programs sponsored by the public schools in co-operation with the State Department of Trade and Industrial Education.

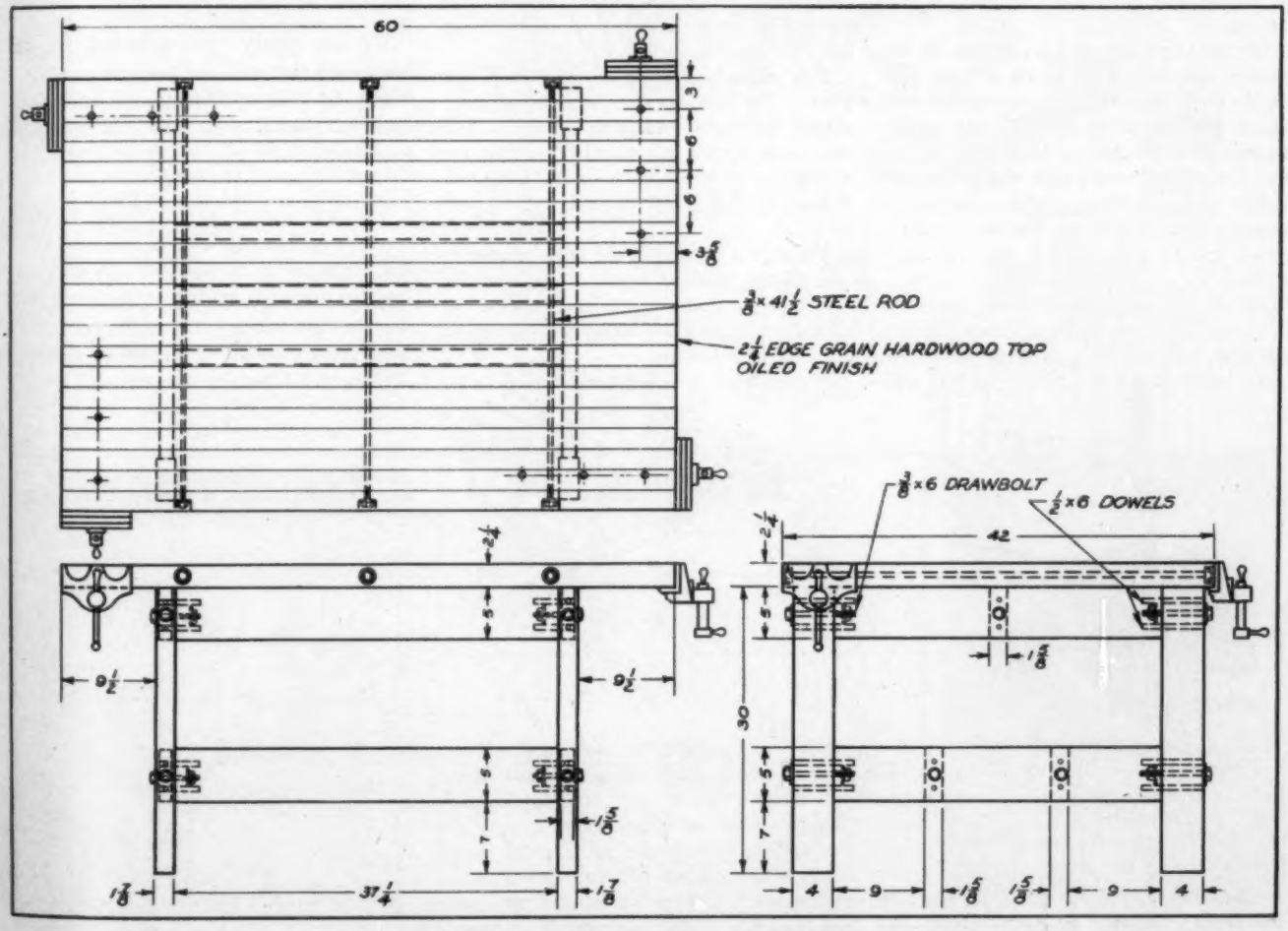
TWO ATTRACTIVE BIRDHOUSES

DICK HUTCHINSON
El Monte, Calif.

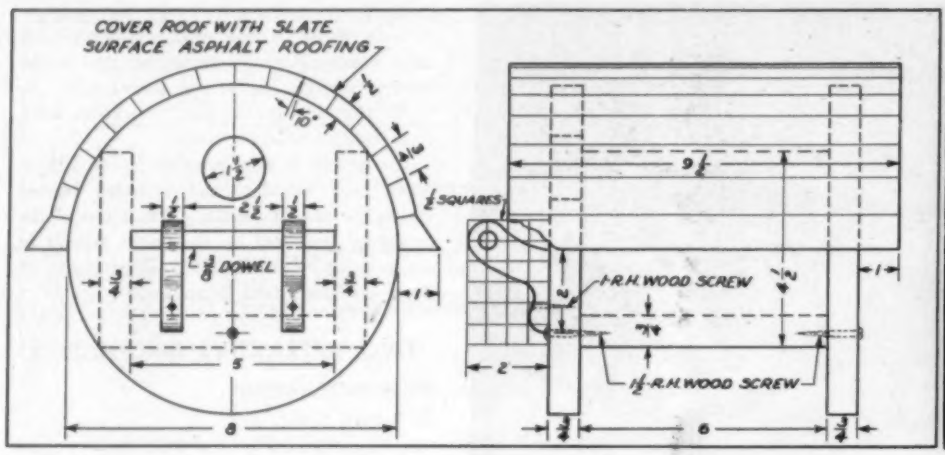
It requires only a little more time to build a really attractive birdhouse than it does to nail up any old box. The nice looking houses really add charm to any lawn or garden.

The two shelters shown differ quite a bit from the ordinary, and yet they are very easy to build.

For the bluebird shelter two disks 8 in. in diameter are cut from ¾-in. pine, and the



Students save day by making workbenches



A simple yet attractive bluebird house

entrance opening is cut in the front disk, then the nesting box is cut out as indicated in the drawing, and the two sides are nailed in with 6*d*. finishing nails, and the heads are set in.

The floor is held in place with two r.h. wood screws. One in each end as shown. This is so that the floor may be removed for cleaning.

Set the arbor saw to read 10 deg. on the vernier, and run out the strips of ½-in. pine for the roof. The two pieces forming the eaves should flare out as shown. This adds to the appearance of the finished house. Nail on the roof, and cover it with a strip of slate surfaced asphalt roofing, allowing a ¼-in. overhang all around. Next, make the bracket perch as shown, and fasten it in place with r.h. wood screws.

Fill all holes with plastic wood, then paint the house any color desired. Cream, with a red roof, or white with green, or black roof make combinations that blend and last well. Drill a ¼-in. hole in the back just under the roof for cross ventilation.

The Robin Shelter

The robin shelter also is built around two disks. The two disks are cut out of a ¾-in. pine board. They are 8½ in. in diameter, and the 6½-in. center is sawed out of the front disk.

This entire shelter is enclosed with the staves. The nesting area is enclosed first, cutting the staves flush with both ends. The two staves serving for the perch support are allowed to extend 2 in. in front. Holes are drilled and the dowel perch is set through these.

The roof is applied in the same manner as that of the bluebird house except that the staves are cut flush with the rear to allow the shelter to be attached with wood screws to the wall of a building.

If the shelter is to be hung in a tree or set on a post, the staves may be extended 1 in. over the rear end.

Cover the roof with the asphalt roofing, and then paint the shelter. If the perches on both shelters are painted black they will be much more attractive.

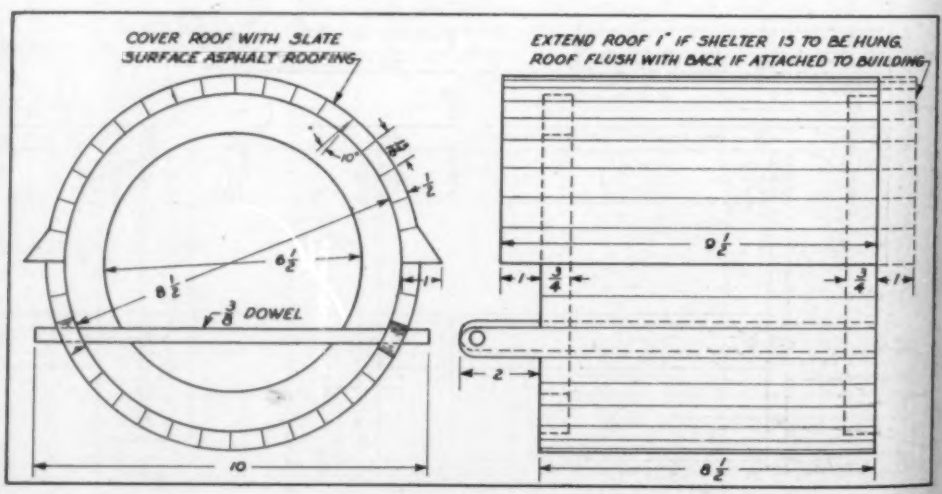
* * *

We are pretty well prepared for an emergency that we hope will not occur.... *Frank C. Moore, Director of Industrial Arts, Cleveland, Ohio, and AVA's 1950 President.*

* * *

The late Henry Ford, genius of mass production himself, made the statement that "the need for skilled artisans and creative genius is greater under mass production than without it." . . . *H. R. Arthur, Supervisor, Trade and Technical Training Section, Ford Motor Company.*

The robin shelter painted gray, and hung on the side of the garage



Details of robin shelter

INDIAN SILVERSMITHING

BEN HUNT
Hales Corners, Wis.

Katcina Neckerchief Slides

Neckerchief slides like the ones shown are collector's items. They are not found on sale at trading posts. The ones described here are replicas of the masks worn by Hopi katcina dancers.

There are about six soldering operations on each one. Medium and easy flowing solder may be used for attaching the separate pieces although the one shown and described was soldered entirely with easy flowing solder. Rouge was painted over the first soldering joints to prevent any possible melting. The step-by-step instructions shown on Figure 1 tell the story pretty well. Solder the half round wire to the blank for the cylindrical piece, No. 1 in Figure 1, and stamp it and the other designs before bending it. No. 4 in Figure 1 also is stamped before cutting to shape to insure a good snug fit for soldering to the cylinder. The eyes and nose should be soldered up first and then the bases filed to fit the mask. The eyes were wired in place for soldering, but the nose was just set in place and soldered.

No. 8, in Figure 1, shows how the turquoise for the eyes were put on lapsticks while grinding them to fit the bezels. They should fit very snug and are set in DuPont cement. Then the surface should be ground level with the bezel and the edges of the bezel flattened slightly with a burnisher.

In making the slide shown in No. 9, Figure 1, twisted wire is used for the ruff and should be soldered to the cylinder after it is bent to shape. The snout is built up of three pieces, as shown at 10. The eyes are a little more difficult since they should be set with turquoise and jet. For the jet a piece of phonograph record may be substituted.

Katcina slide

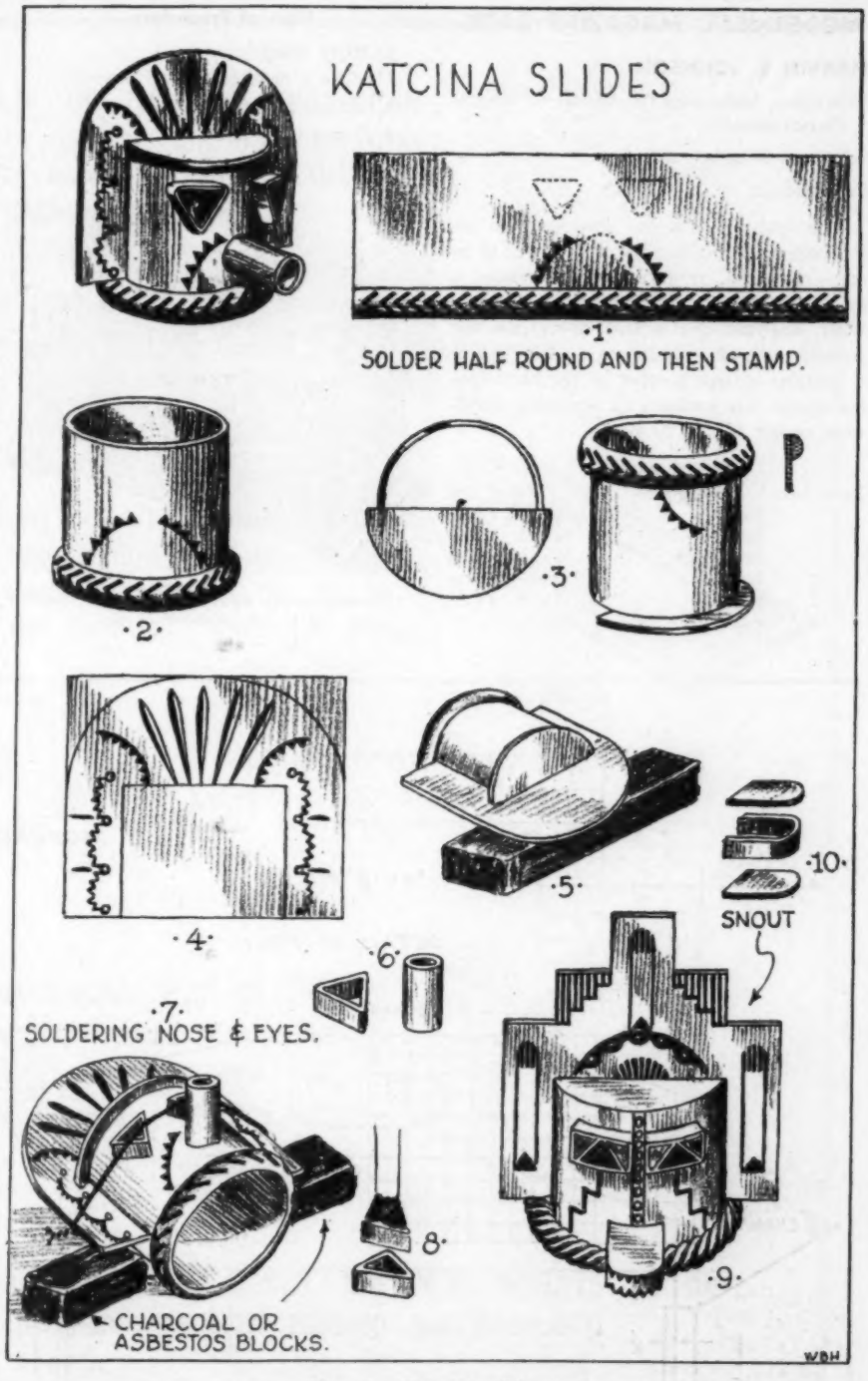


Fig. 1. Katcina slides

These neckerchief slides are not as difficult to make as they appear at first glance, and if the parts are carefully filed and fitted, the soldering is more intriguing than difficult. There are a great many more designs of katcina masks that may be adapted to these slides. See *Ceremonial Costumes of the Pueblo Indians* by Roediger and *Hope Kachinas* by Edwin Earle.

Interesting lapel pins can also be made by leaving off the back half of the cylinder, and letting the flat ornament, shown at No. 4, Figure 1, cover the entire back.

* * *

About 1,000,000 pounds of Alcoa aluminum was directed during 1949 to manufacturers of aluminum nails.

MODERNISTIC MAGAZINE RACK

MARVIN E. JOHNSON

Instructor, Industrial Education Department

Southern Illinois University

Carbondale, Ill.

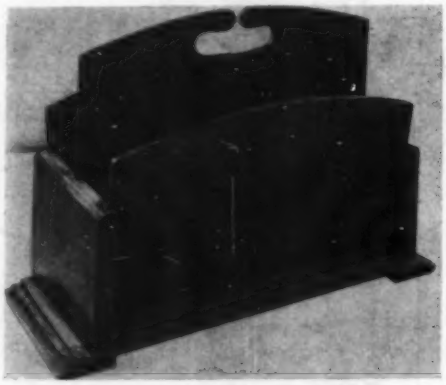
This magazine rack was developed for use in a beginning woodwork class. It proved to be quite successful, as its appearance created a great deal of interest among the students. When analyzed and broken down into the learning units involved in making this project, it contains a large number of the basic tool operations that students in beginning woodwork *should be able to do.*

BILL OF MATERIAL

No. of pieces	*Name of part*	*Size*
1	Base	¾ x 7½ x 15½
2	Ends	¾ x 5 x 7½
2	Feet	¾ x 1⅞ x 7½
1	Partition	¼ x 11 x 14½
2	Side	¼ x 8 x 14½
4	F.h. wood screws	No. 8 x 1¾

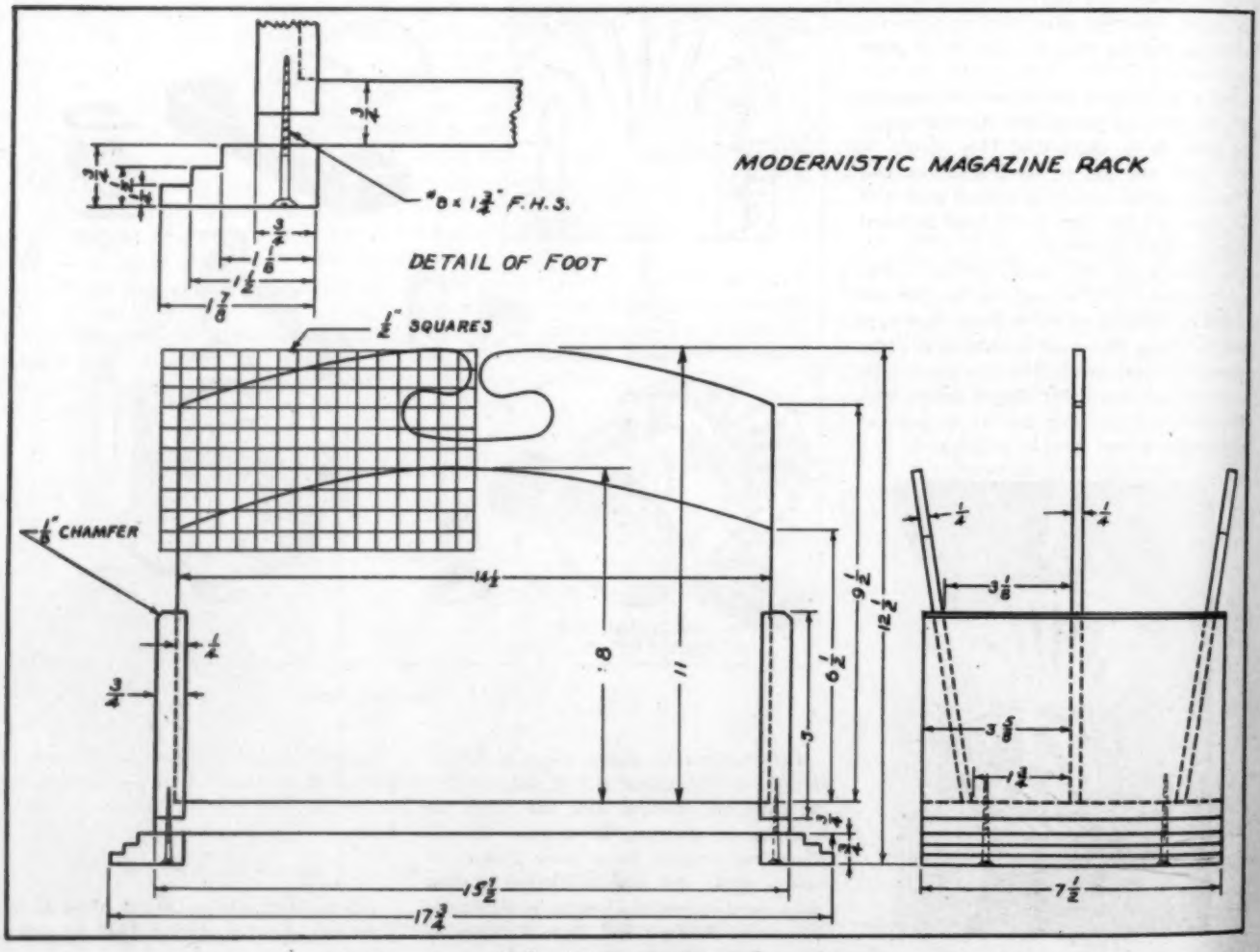
Plan of Procedure

1. Study blueprint.
2. Make a detailed plan of procedure.
3. Make a bill of material.
4. Secure stock and check.
5. Cut stock to proper length.



— Photograph by Bill Harrell, Southern Illinois University, Carbondale, Ill.

6. Square base to finished dimensions.
7. Square up ends.
8. Square feet.
9. Lay out and cut rabbets on ends of base with backsaw and chisel.
10. Lay out and cut steps on feet.
11. Lay out and cut dadoes on the ends for center partition and sides.
12. Apply glue to rabbets of ends and glue the ends to the base. Be sure base and ends are square with each other.
13. Drill holes in feet and countersink for flathead screws.
14. Attach feet to base with screws.
15. Lay out design of center partition on squared paper.
16. Transfer design to ¼-in. plywood and saw out design.
17. Glue partition into the dadoes in the ends.
18. Lay out and cut sides so that they will slide into dadoes cut for the sides.
19. Finish sand all surfaces.
20. Finish as desired.

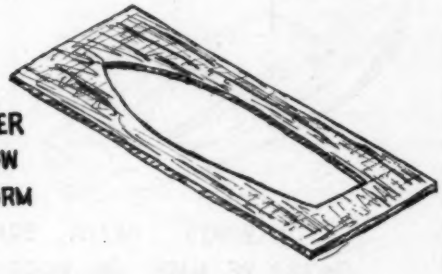


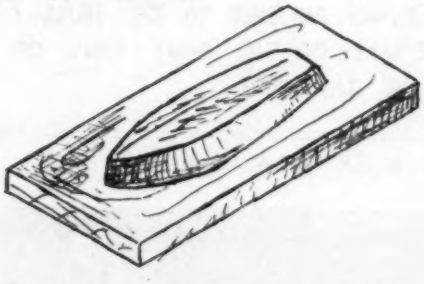
Modernistic magazine rack

SELECT PLANS. HULLS UP TO 15" IN LENGTH CAN BE HANDLED EASILY. SEVERAL OF THE MECHANIC MAGAZINES FEATURE PLANS FOR FULL-SIZE BOATS. THESE PLANS CAN BE SCALED TO THE DESIRED SIZE.

MAKE A FULL-SIZE PATTERN OF THE HULL FROM PINE OR BASSWOOD. SAND TO A VERY SMOOTH FINISH.

MAKE A WOODEN FORM TO FIT OVER THE HULL PATTERN. THE OPENING SHOULD BE 1/8" LARGER THAN THE HULL. THIS ADDED DIMENSION WILL ALLOW FOR THE THICKNESS OF THE PLASTIC. MAKE THE FORM FROM 3/8" PLYWOOD.





MOUNT HULL PATTERN ON A BASE MADE OF 3/4" THICK WOOD.

TO DETERMINE AN ECONOMICAL SIZE OF THE PLASTIC USED TO FORM THE HULL FORCE A PIECE OF PAPER DOWN OVER THE HULL PATTERN WITH THE FORM. TRIM TO WITHIN 3/4" OF THE PATTERN. THIS WILL DETERMINE THE SIZE OF THE PLASTIC.

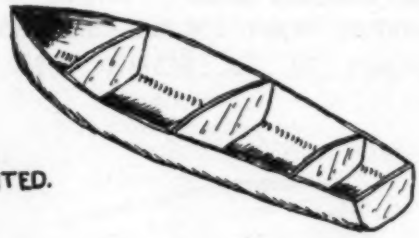
PLEXIGLAS OR LUCITE 1/16" THICK HAS GIVEN THE BEST RESULTS TO DATE. HOWEVER, PLASTIC UP TO 1/8" THICK HAS BEEN FORMED SUCCESSFULLY.

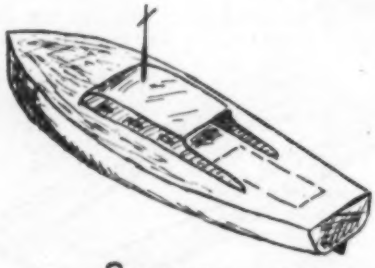
HEAT THE PLASTIC UNTIL IT IS THOROUGHLY PLIABLE — ABOUT AS FLEXIBLE AS A SHEET OF SOFT RUBBER. *GENTLY* FORCE THE PLASTIC OVER THE HULL PATTERN WITH THE FORM.

TO TRIM THE EXCESS PLASTIC FROM THE HULL MAKE A CUTTER FROM A CLOCK COG. CHUCK IT UP IN THE DRILL PRESS, SET THE CUTTER TO DEPTH AND TRIM SLOWLY.

Heat forming a plastic model boat hull. Submitted by John R. Walker, Bel Air, Md.

CEMENT BULKHEADS OR ENOUGH FORMERS TO MAKE THE HULL RIGID. IF A SMALL ELECTRIC MOTOR OR CO_2 ENGINE IS TO BE USED TO POWER THE BOAT, THE MOTOR MOUNTS CAN BE CEMENTED INTO PLACE. FOLLOW THE INSTRUCTIONS ON THE PLANS AS TO WHERE THE MOTOR IS MOUNTED.





THE DECK IS MADE ALONG THE SAME PRINCIPLES AS THE HULL. AFTER IT IS MADE IT CAN BE CEMENTED IN PLACE WITH THE CABIN AND MAST.

REMEMBER TO ALLOW AN OPENING TO GET AT THE MOTOR TO CHANGE THE BATTERIES.

SAILBOATS OFFER SOME OTHER PROBLEMS. TO CUT DOWN WEIGHT THE MAST SHOULD BE MADE OF WOOD AND IT SHOULD BE FIRMLY FASTENED TO THE HULL. TO COMPLETE THE SAILBOAT THE SAILS SHOULD BE MADE OF THE SAME KIND OF MATERIAL AS THE LIGHTER SHOWER CURTAINS OR TABLECLOTHS

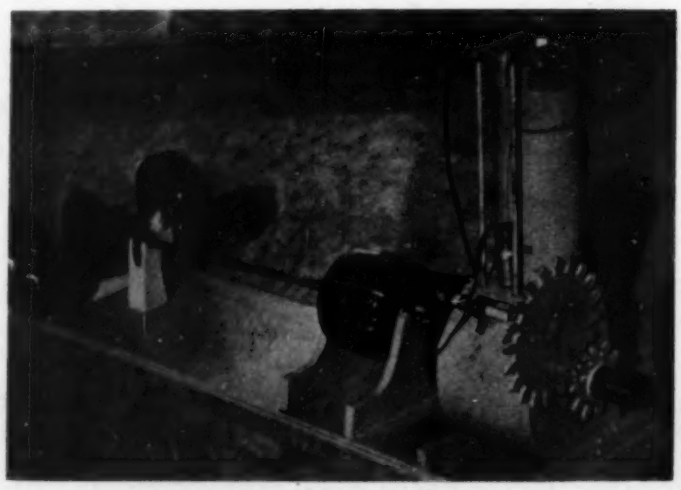
Putting in the bulkheads and decking the boat. John R. Walker, Bel Air, Md.

VISUAL AID — CUTAWAY MODEL OF AN AUTOMOBILE POWER TRAIN

EVERETT E. KOEHLER
Instructor, Power Mechanics
State Teachers College
Fitchburg, Mass
and
RAYMOND SLUSARZ
Central Junior High School
Pittsfield, Mass.

If a picture is worth a thousand words, then a model must be worth ten thousand. This is especially significant in teaching, because what would take hours in telling, will take only minutes in showing and explaining, thus saving time for other lessons and work that would otherwise be left untouched.

Visual aids are especially adaptable for teaching a subject like power mechanics, in which the equipment is bulky and complicated. It is obviously difficult for students to see through the maze of wires, fixtures, and gadgets that camouflage the mechanical principles concerned with the internal moving parts. A model, however, strips the car of these confusing elements, revealing only the basic principles that make it work.

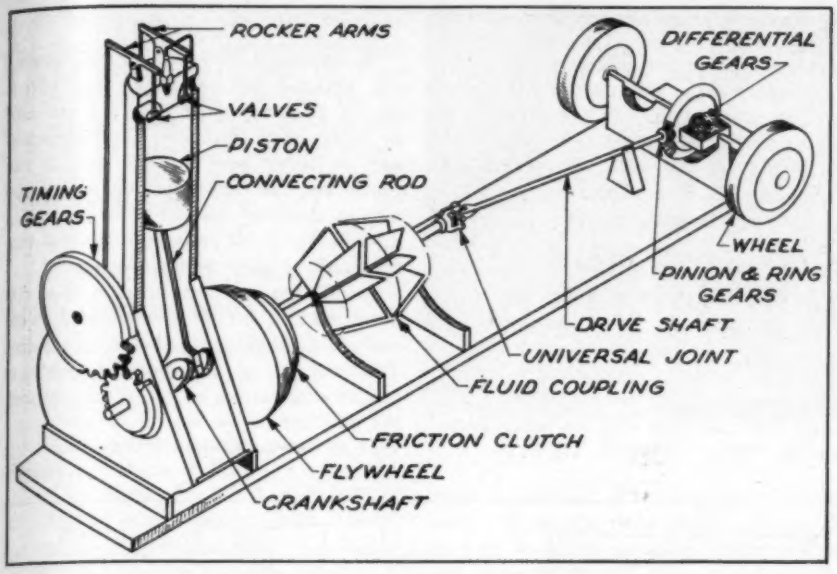


Visual aid — automobile power train

The model represents a type of problem that is within the comprehension of the pupil. With the aid of books and charts, many pupils could figure out for themselves how power is generated and transmitted. In other cases, the model would serve to help teach lessons on the individual units that comprise the auto, not as abstractions, but as essential elements of the whole power train. With the ease with which it is comprehended, it also saves valuable time for broader and deeper coverage of the subject.

The teaching values are not limited to its visual demonstrations alone, but as a general shop project, it may well serve as the core of the automotives division of the power mechanics area.

In addition to teaching automotive principles, which is part of the power mechanics course, building such a model would challenge



Visual aid cutaway model of auto power train

the drawing department, as well as the wood, metal, and plastic areas.

There are no fixed dimensions for the various parts, since modifications and improvements are limited only by the materials on hand, and the resourcefulness of the students and instructor. The model pictured is roughly 36 in. over all, with the engine alone standing about 14 in. high.

The cutaway engine is made almost entirely of scrap stock, glued up in some cases and turned on the lathe in others. The compression ratio must be carefully figured out and drawn up, taking into consideration, crankshaft throw, connecting rod length, cylinder diameter and length, and piston displacement, so that all are in proper relation to each other.

The timing gears must have a ratio of two to one so that the valves will open on every other revolution, in keeping with the principles of the four-stroke cycle engine. Any stock of about one-quarter inch thickness that doesn't warp or split easily will do for these gears. The camshaft operates the dowel push rods, as well as the spark switch. A flashlight battery and bulb substitute for the conventional spark ignition system. The plug is merely a dummy, with hidden wires lighting the flashlight bulb beneath it. The battery is strapped to the back of the cylinder.

A turned flywheel of wood, with an accompanying disk on a sliding shaft will demonstrate the principle of the friction clutch.

The fluid coupling housing is made of two plastic saucers about 4 in. in diameter and 1 in. deep. A search of the local five and dime stores should turn up some suitable saucers or cups such as are used to store leftover foods in the refrigerator. The exact dimensions of the other parts will be determined by the size of the saucers that are used for the model. One-quarter inch oil burner couplings serve as bearings and packing glands after being drilled to fit the shafts on which the impellers are mounted. The impellers can be of Masonite, glued to a hub so that there is about 1/16-in. clearance between them and the plastic saucer housing to eliminate any friction. The shaft of each impeller butts against the other so that each may turn independently, yet be very close to each other. Before assembling the two halves, see that both impellers run free, and that the bearings are sealed against leaks. Drill a small filler hole in one section and then cement the two halves together. Fill the unit with a light oil, such as castor or mineral oil, and seal up the filler hole with scotch tape. By turning one of the impellers, a centrifugal force will be created in the liquid, causing it to exert a cushioned force on the other impeller, demonstrating quite clearly the basic principle of fluid drive units found on most modern cars.

A short piece of quarter inch copper tubing, filed flat on opposite sides, split, and then bent on to a cross member will make a basic type of universal joint that will show how power can be transmitted through angles.

A hand drill provided the pinion and ring gear for the differential, with spider gears made of wood to complete it.

The assembly is mounted on a piece of plywood and driven at the flywheel with a rheostat-controlled electric motor of the sewing machine type, to simulate the throttle action.

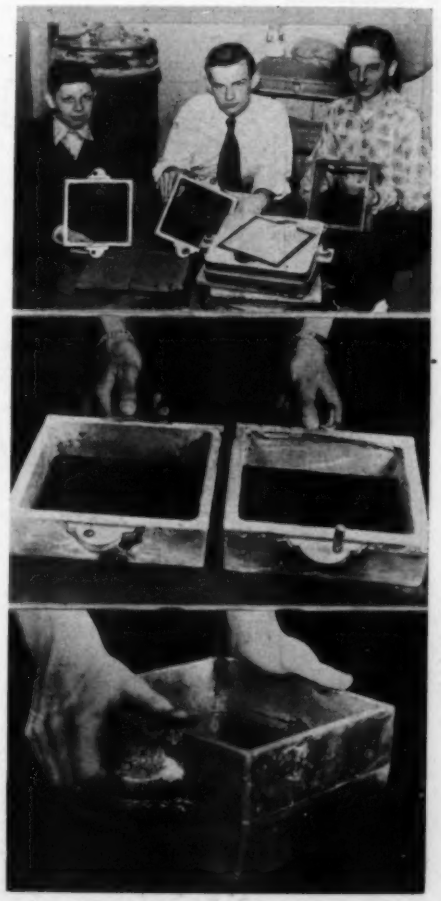
The variety of materials and processes, plus the mechanical principles and creative ingenuity required in constructing this visual aid project, would make it a worth-while addition to any industrial-arts shop.

A SMALL FOUNDRY FLASK

CHARLES W. CARLOCK
General Shop Instructor
High School
Hobart, Ind.

A very sturdy foundry flask of convenient size to use for casting small projects can be made in the general shop foundry area. This small flask makes an excellent project and is one which can be kept in the foundry for future use. The flask is large enough for molding ash trays, paperweights, etc., thus eliminating the extra work and time needed to fill the larger flasks for small size projects.

The machining processes needed to complete these flasks may be taken care of in the machine shop, or they can be performed with the regular hand tools in a general shop. Another important fact about this flask is that it is made of aluminum, and therefore, is easier to lift and handle. This is an important consideration for the junior high classes where there are many small boys who find it difficult



A small foundry flask

to lift the heavier flasks. Also, it can be made in any foundry which has 12 by 12 by 6-in. flasks, and a melting furnace capable of melting aluminum or aluminum alloys. The finished flask (cope and drag) weighs approximately 8 lb. The weight will vary slightly due to the difference in amount of machining needed for each pair.

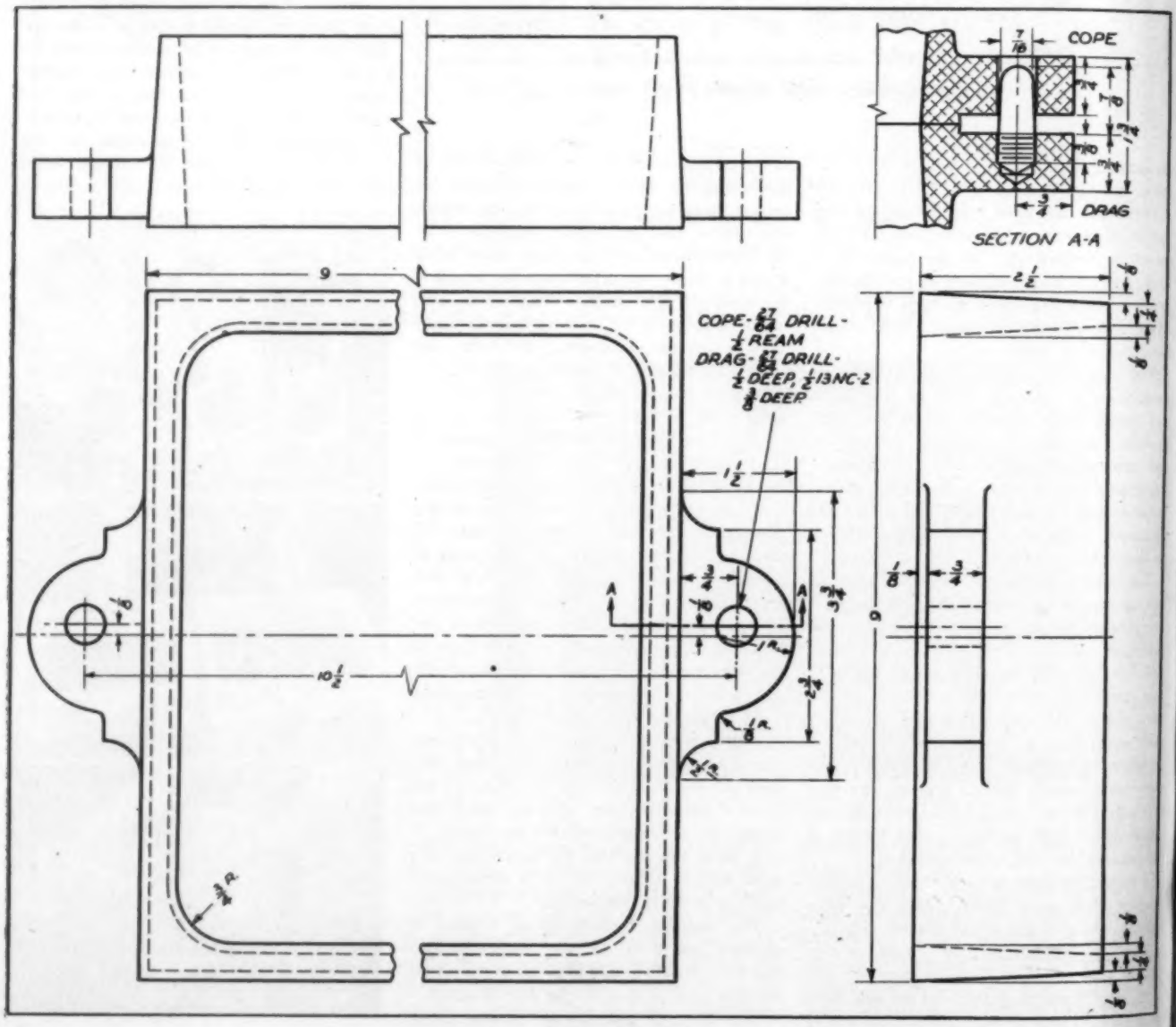
Pattern

Make the pattern of white pine with bee's wax fillets. Six pieces of wood are needed. The sides were made from a ⅜-in. piece tapered to ¼ in. on one edge. In joining them together, care must be taken to assure that the angles where corners are formed are cut properly. In fastening the ends of the four side pieces, care must be taken to be sure that the proper amount of draft is formed on both sides of all four pieces. This draft must be formed in this manner or the pattern cannot be drawn from the sand mold properly. This draft is ⅛ in. on the outside and ⅛ in. on the inside. Study the working drawing to see the proper angle at which the various cuts should be made. The joints are held together with 6*d*. finishing nails. The drawing illustrates the bosses set ⅛ in. down from the upper edge of the cope or drag. The two bosses were made of ⅜-in. pieces with the upper edge flush with the mating edge of the cope (drag), then ⅛ in. of the material was machined off so it would not form a trap which would hold any excess sand. This sand may hold the cope away from the drag and not allow proper mating.

Casting

The aluminum alloy used in these castings was obtained by remelting used aircraft engines. It is very tough alloy and will stand up under severe treatment. The irregularities such as flashes were removed with an aluminum file. The mating surfaces were leveled with an aluminum file and tested on a bench saw top. The inside surfaces of the flask were left rough so as to reduce fall outs.

The aligning pins were made of ½-in. cold rolled stock. The pins were threaded on one end and screwed into the bosses on the drag. The outer end of the pins were rounded to facilitate the placing of the cope on the drag. We experimented on one set by machining a 1/32 in. taper on the pins in order to facilitate



A small foundry flask

placing the cope on the drag. This improvement, I believe, is worth the extra time spent in cutting the taper on the pins. The holes were drilled through the cope and drag in one operation. A size 27/64-in. drill was used for this and the holes in the cope were reamed out to ½ in. The holes in the drag were threaded with a ½-in., 13 tap.

MAGAZINE RACK

CHRIS H. GRONEMAN
Industrial Education Department
The A & M College of Texas
College Station, Tex.

Designers and craftsmen agree that the magazine rack shown in Figures 1 and 2, has a most satisfactory design because of its simplicity and careful selection of materials. Combinations of wood and Plexiglas or Lucite and plate glass provide relatively inexpensive projects which anyone would be pleased to make and own.

Interesting surface decoration can be provided with a few shallow saw kerfs as illustrated in Figure 1. A bleached finish on the wood with crystal-clear plastic produces a piece of occasional furniture that would be welcome to the most discriminating decorator.

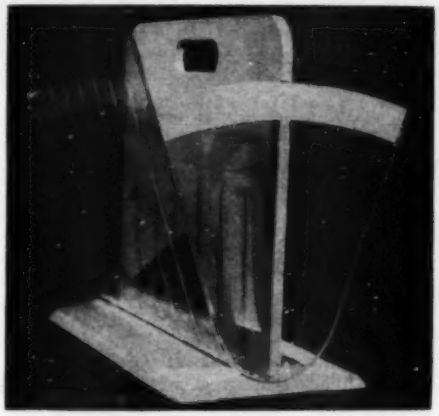


Fig. 1. Magazine rack

This magazine rack is somewhat more difficult to construct than the small plastic accessories, but it is a challenge to a craftsman interested in this type of fabrication and rewards his efforts with a highly useful and satisfying piece of furniture.

BILL OF MATERIAL

Quantity	*Material*	*Description*	*Dimension in inches*
1	Plastic	Holder	⅛ x 15 x 30
1	Wood	Base	¾ x 7 x 15
1	Wood	Center	½ x 12½ x 15
2	Wood	End braces	½ x 2 x 9
8	Screws, wood, nickel	R.H.	No. 6 × 1
	Finishing material for wood parts		

Procedure

1. Lay out a full size template of the rack on Plexiglas or Lucite.
2. Cut with a circular saw.
3. Plane or file the edges.
4. Sand the edges.
5. Buff the edges if desired.
6. Ornament the sides of the rack with shallow saw kerfs, if preferred.
7. Heat and bend the plastic rack over a wooden form.
8. Make the wooden parts.
9. Apply the finish to the wooden parts.

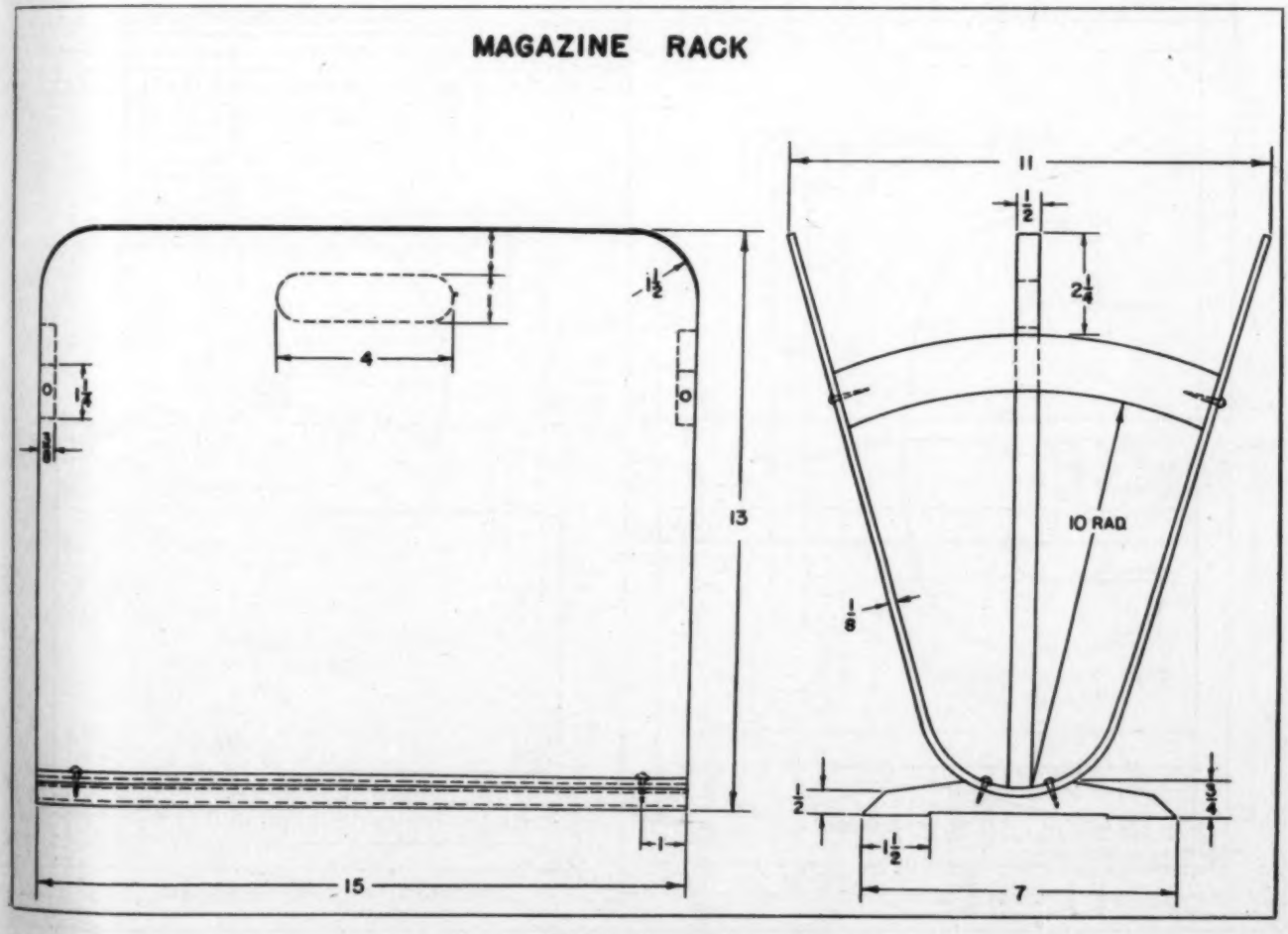


Fig. 2. Details of magazine rack

10. Mark, center punch, and drill the holes in the plastic for fastening to the wood.

11. Assemble all parts with wood screws.

12. Apply a coat of wax and polish with a soft cloth.

TELEPHONE SHELF

I. M. FENN
Chicago, Ill.

This practical project will appeal to instructors and their students. It deals with the fundamental woodworking processes and is simple to construct. Material can be obtained by gluing up scraps of wood. This telephone shelf has been designed to hold the standard size telephone directory on the bottom shelf, the telephone in one corner of the top shelf, and a pad of paper for messages with sufficient room for writing in the remaining space on the top shelf. This is really a very handy telephone shelf.

Directions: Study the drawing and determine, according to available material, the number of pieces to be glued up. Square all edges to be glued. Next square all sides of the two pieces for (A). Cut to the shape shown. In the same way, prepare the two pieces for the shelves (C). Square the two pieces for the brackets (B) (D). Shape as per design in drawing. Bore holes in all pieces for dowels, and for fastening to the wall. Sandpaper, and assemble to try all parts for fit. Use glue and dowels for final assembly. Finish with stain, shellac, or lacquer to match surroundings.

Experiences: Reading a drawing, obtaining material, squaring, gluing, sawing, measuring, boring, filing, shaping, sanding, assembling, and finishing.

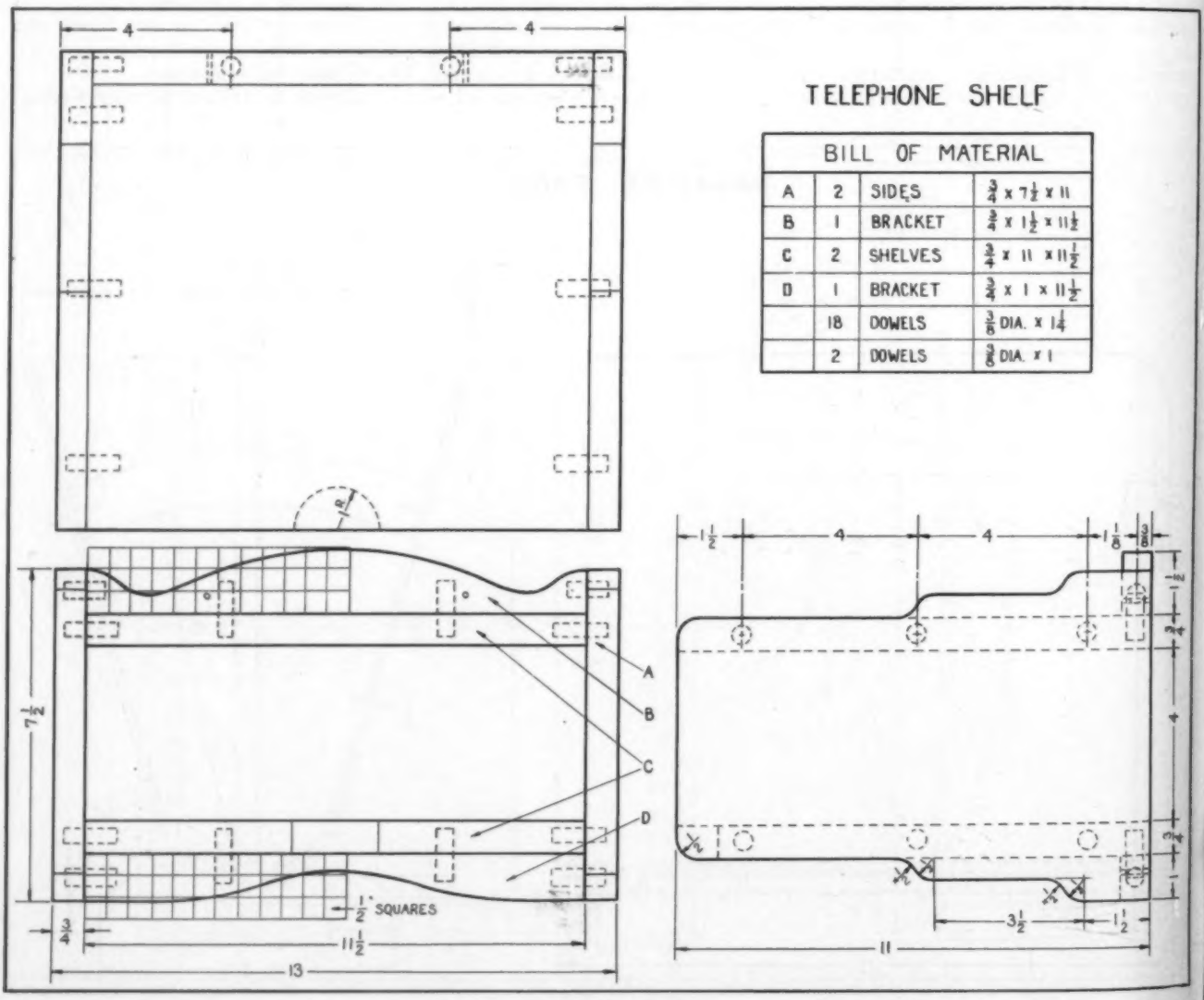
* * *

Aluminum shells suspended by balloons 20 miles above the earth hold scintillation counters which measure cosmic rays.

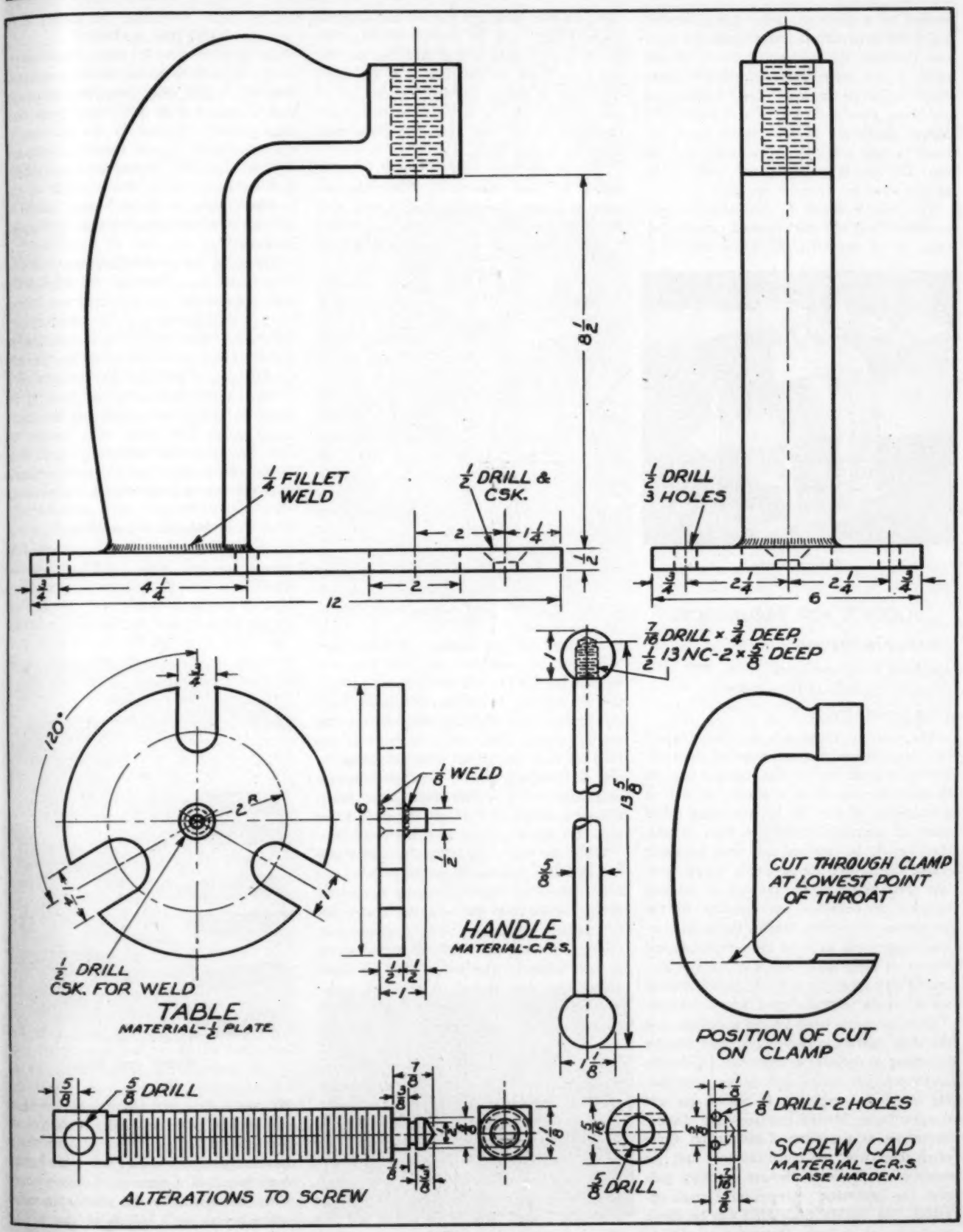
ARBOR PRESS

E. W. DIEHL
Instructor, Vocational Machine Shop
Beall High School
Frostburg, Md.

Frequently there is need for a small press when assembling parts in the shop and when pressing mandrels into work to be turned on a lathe. A simple press for such use can be made from a large heavy duty C clamp and pieces of plate. The C clamp, which should be at least 8 in., and of the heavy duty drop forge type (which may probably be picked up in surplus material), is cut off at the lowest point of the throat as shown in the working drawing. Care should be taken to see that the cut is at right angles to the tapped hole and screw of the clamp. The cutoff clamp is then



Telephone shelf


1/4 FILLET WELD
1/2 DRILL & CSK.
8 1/2
1/2 DRILL 3 HOLES
3/4
4 1/4
2
12
1/2
2 1/4
6
120°
2 3/8
1/2 DRILL CSK. FOR WELD
TABLE
MATERIAL-1/2 PLATE
1/8 WELD
7/16 DRILL × 3/4 DEEP, 1/2 13 NC-2 × 5/8 DEEP
13 5/8
HANDLE
MATERIAL-C.R.S.
5/8
1 1/8
CUT THROUGH CLAMP AT LOWEST POINT OF THROAT
POSITION OF CUT ON CLAMP
5/8 DRILL
7/8
1 1/8
ALTERATIONS TO SCREW
1/8 DRILL-2 HOLES
SCREW CAP
MATERIAL-C.R.S. CASE HARDEN.

Arbor press

welded to a piece of boiler plate through which has been drilled several holes for bolts and clearance for working. A small circular table is also made from scrap boiler plate, faced, drilled in the center for a locating pin and three slots worked into it to hold work. Minor alterations on the clamp screw are made to take a handle and a freely rotating cap. The cap is machined and held to the altered screw by means of two pins.

The press is simple to construct and easy to operate and will exert unusual pressure because of the inclined plane of the screw.

Arbor press

PLASTICS FOR PROJECTION

JAMES ANDERSON
Machine Shop Instructor
Queens Vocational High School
Long Island City, N. Y.

The value of visual aids has been realized for many years by generations of shopmen. Back in the old days it was common practice to show the apprentice a sample, as well as a blueprint, of the job he was being called upon to produce for the first time. It was, therefore, to be expected that upon becoming school instructors, the shopmen would carry into their new jobs the practice of showing samples of desirable workmanship to the youngsters whom they taught. Group instruction reduced the value of the sample job and the use of oversized models was found to be a satisfactory substitute until the lack of storage space brought emphasis upon their limitations.

Then came the trend toward projection and the shop instructor proved his versatility by becoming an operator of motion and slide film projectors, balopticons, and opaque projectors. He found that each has its advantages and disadvantages. Motion pictures have distinct limitations as a medium of instruction. Quite often they cover too much territory and, for many of the students who are watching, pass over the important processes of a trade operation too quickly. Slide films can be shown much slower and the instructor is able to inject his own ideas into that of the projected lesson. "But," says the *average* student, "we do not have a lathe in our shop like the one which is shown on the slide film. We don't shift belts to change speeds." The solution to this problem lies in a 35mm. camera, two floodlights, 2 by 2-in. slides and many man hours of unpaid labor.

This is the road that we have traveled during the past few years in the machine shops at Queens Vocational High School, with the usual percentage of success and failure measured by students' understanding and progress.

Recently the school was given the use of an overhead projector, proving that our local board of education had become visual minded. Overhead projectors are not new in the educational world; they have long proved their worth in elementary and high schools as well as in colleges and universities. The material projected being slides, (drawn or photographic) transparences, tracings or a transparent cellophane-like material on which the instructor may write or sketch as he develops his lesson.

When the overhead projector arrived in the machine shop we utilized the 3¼ by 4-in. slides, made while taking our training at the Industrial Teacher Training Center of New York State Department of Education, but noticed little upswing in either the interest or the understanding of our students that could be credited to this medium of instruction. Whenever the overhead projector was used we were bothered by a mental comparison with this and a projection comparator of the Jones and Lamson type. One day when one aspiring machinist came along with a thread that had been cut deep enough but would not enter the nut, we thought it time to test the comparator possibilities of an overhead projector and it showed a thread with a sixty degree included angle but quite lopsided with the center line.

When the faulty thread was projected side by side with a well-cut thread the evidence was convincing. The fault, of course was in the setting of the tool bit with the center line of the lathe. It proved to be a good opportunity to try out the overhead projector with a new medium. The lesson was developed around the faulty thread, to which was added an example of good thread cutting, a thread-cutting tool bit and a center gauge. The result was gratifying.

The projected images were in silhouette, black on white and a little cumbersome because of the varying thicknesses, but something had been added that held student interest and attention; it was *movement*. The incorrect and correct methods could be shown with the reasons demonstrated and explained. Everybody could see because the overhead projector is used close to the screen and thus gives a brilliant picture. The reflecting mirror can be tilted, permitting the picture to be projected higher than eye level.

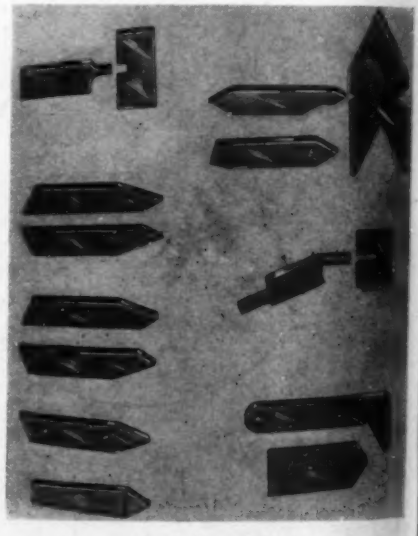
The next experiment was to show how to check the angle of the cutting edges of a twist drill with a drill point gauge. To do this we used a regular twist drill and a gauge (student project). Because of the difference in the thickness of the two tools, some difficulty was experienced in keeping the projected picture in sharp focus. The solution to this problem was soon evident; both had to lie flat and be made from material of the same thickness.

This being the early "Plastic Age," we tried clear Lucite for our models and although this gave good results the next step was easy to reach — it required color to attract the eye and permit the difference between alignment and misalignment to be shown by the white light passing between the two colored models.

The next step was to go back to the lesson on setting a thread-cutting tool with a center gauge. The models were made of the most recent of the colored plastics; flame colored fluorescent Lucite, which projects a beautiful and unusual color on the screen.

Models — Tool Bits

Models, slightly oversize, were made of the various standard shape lathe tools, one end showing the cutting edge angle and whether a right or left hand cutting tool, the other end shaped to the correct clearance and back rake.



Model tool bits

We found these very helpful in showing the relationship of the tool angles to the work and gave the student a better idea of what a specified *angle looks like* on a turning tool. A statement of *X* number of degrees is never likely to register in the mind of a student unless he can see a picture of what so many degrees look like *to the naked eye*.

Models — Threads

The use of colored plastic models resulted in better student understanding of every lesson that incorporated their use. We checked up on those lessons that we had found difficult to *put across* and wherever possible developed a model to help out. Terms relating to screw threads are made more understandable if the instructor points out the major, minor, and pitch diameters, pitch, angle, width of root and crest, and the depth of threads, with a pointer made of green translucent plastic on a flame colored model of the cross section of a thread. Mating models of threads were used to show the depth of engagement, crest clearance, etc., of the more commonly used threads such as Sharp V, National Standard, Acme, and Square. Models were also used to show how the tool bits should be ground and set; tools and gauges being exact copies of those used by the students when doing the job.

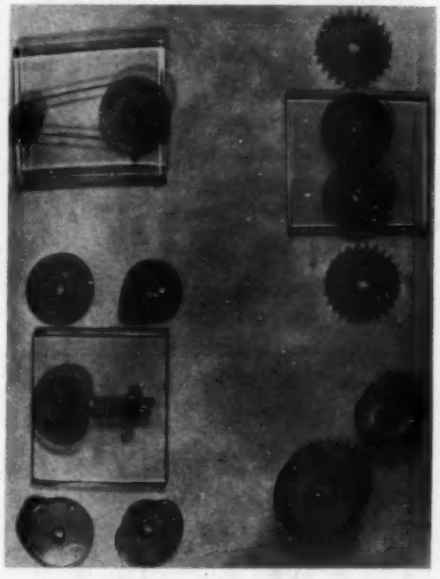
Every machine-shop instructor must have experienced a feeling of frustration when, after giving a lesson and demonstration, and after following these with individual instruction on the method of using adjustable round split dies, he still finds broken dies in the holder from time to time.

We made clear plastic models of a die and a die stock, the latter complete with three adjusting screws made of a black plastic. With these models, using the overhead projector, the instructor can point to the weak part of the die, opposite the split, and compress the sides with his fingers. The enlarged projection shows clearly on the screen how, by adjusting the screws, the die is made to cut larger or smaller threads.

Models — Gears

A couple of weeks ago a machine-shop student was assigned the job of removing the worn tumbler gears from an engine lathe and making new ones. He was told to get all of the information he required for the making of the new gears from the old. He startled his instructor by requesting a gear cutting milling cutter of a pitch number in three decimal places. It was suggested to the student that in his computations he had forgotten that the outside diameter of the gear was worn. That, claimed he, was impossible since the top and bottom of the teeth could not touch. "Remember the clearance, Mr. A," said he. Like most enthusiastic youngsters he had to be *shown;* telling was not enough. The worn tumbler gears were placed on the overhead projector; the worn teeth were plain to see; when meshed the teeth engaged until the tops rubbed the bottom. A pair of plastic gears were made from ½-in. clear Lucite; one of them was tinted blue. They were placed on the projector and meshed. It was quite easy to show that when a gear becomes worn it will mesh deeper and result in the tops of the teeth wearing down — unless they are carefully observed while being adjusted.

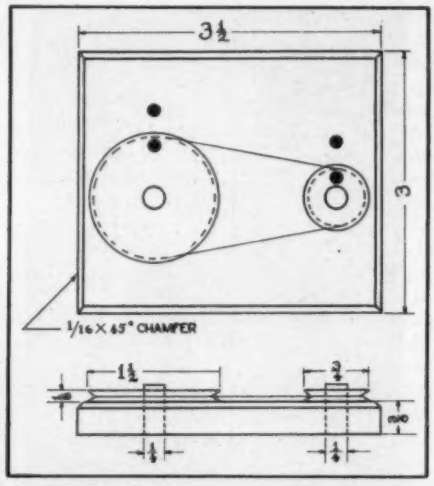
The gear models have also proved valuable when showing the parts of a gear tooth: *face, flank, clearance, working depth.* The *point* of *applied pressure* can be shown, as can the *pressure angle,* by slowly revolving the meshed gears under the lens of the overhead projector.



Model gears

In order to show the evolution of gearing from a pair of cylinders in peripheral contact, another model was made. First, a piece of ¼ in. thick clear plastic into which two 5/16-in. dia. pins were placed on carefully spaced centers. Then two disks were made from green fluorescent Lucite. After drilling they were placed on the 5/16-in. pins with sufficient peripheral contact to turn both when movement was given to one. This movement was shown by means of the overhead projector. When frictional load was applied to the *driven* disk its movement stopped. Flame colored fluorescent Lucite was used to make a pair of gear toothed disks to slide on the 5/16-in. pins over the green disks and the

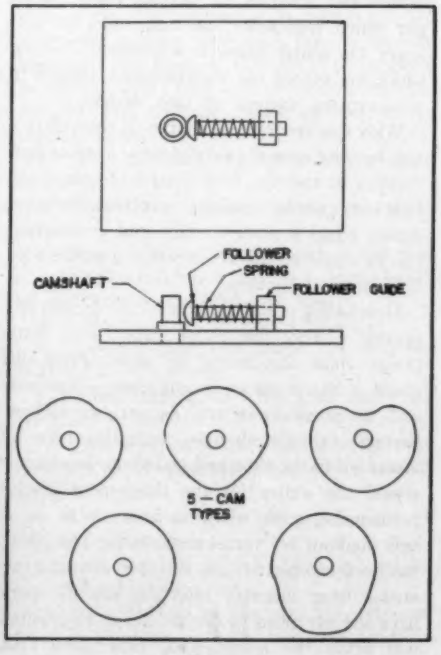
Projecting gear models



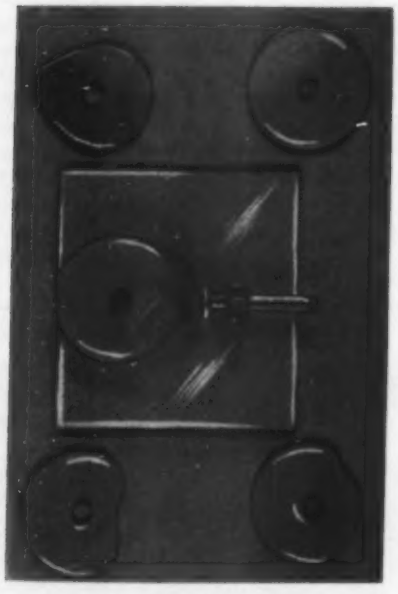
Model for demonstrating pulley ratios

positive turning action of the gear tooth was seen by all. The pitch circle of the gears was clearly seen because of the darker colored disks below and the *addendum* and the *dedendum* (add — deduct) can be better understood by those who *see* and *listen.*

A model was then made to demonstrate pulley ratios. A piece of clear Lucite was used to hold inserted plastic pins 2½ in. apart. Two colored disks were made; edges Veed, center hole drilled, and a black spot placed on the face of each, near to its outside edge. One disk was 1½ in. dia., the other ¾ in. dia. When placed on the center pins they were connected by a *belt* consisting of a few strands of cotton thread. Two spots were made on the plastic base and these were used to line up the spots on the pulleys for



Cams



Cam speed ratios

the starting position. One turn of the driving pulley turns the driver twice. This model has been helpful in demonstrating pulley ratios, direction of movement, belt problems, and cutting speeds.

The most recently developed model in the eight weeks' experiment with an overhead projector shows the value of this new technique in the teaching of applied physics. It is a model designed to show the rates of speed obtained by use of various standard shaped cams. A clear plastic base was used and on it a piece of colored plastic was glued; it was drilled and acted as the bearing for a plastic pin which represents the cam roller or follower. On center below is a stationary pin on which are placed the colored disks, shaped in a recognized variety of cam designs.

With this model it is simple to show that a fast moving cam should not have very abrupt changes of motion. It is possible to show the follower passing through varying distances during equal periods of time and comparison can be made of the acceleration possible with different shaped cams.

Developing plastic models for projection has proved a very interesting experiment. Two things come uppermost to mind. *First*, its scope is like a man's imagination — limitless, and its possibilities are, as yet, untouched. *Second* — results obtained with this type of visual aid in the shop and classroom has amply repaid the writer for the time spent in experimenting with what he believes to be a new medium for visual instruction. The circle has been completed; the shopman brought the *model* from industry into the schools; perhaps the overhead projector, aided by plastics will bring the *model* back into favor, for storage of this type of model needs very little space. In fact sufficient models for any lesson can be carried in one's vest pocket; and, who can tell, perhaps industry may be pleased to borrow back from the school the *model*, plus the shop instructor's projector, for in this day of quick changes in production procedure new techniques must be learned rapidly. Plastics *for projection* have been found to be excellent for that purpose.

A DEMONSTRATION FOUNDRY UNIT

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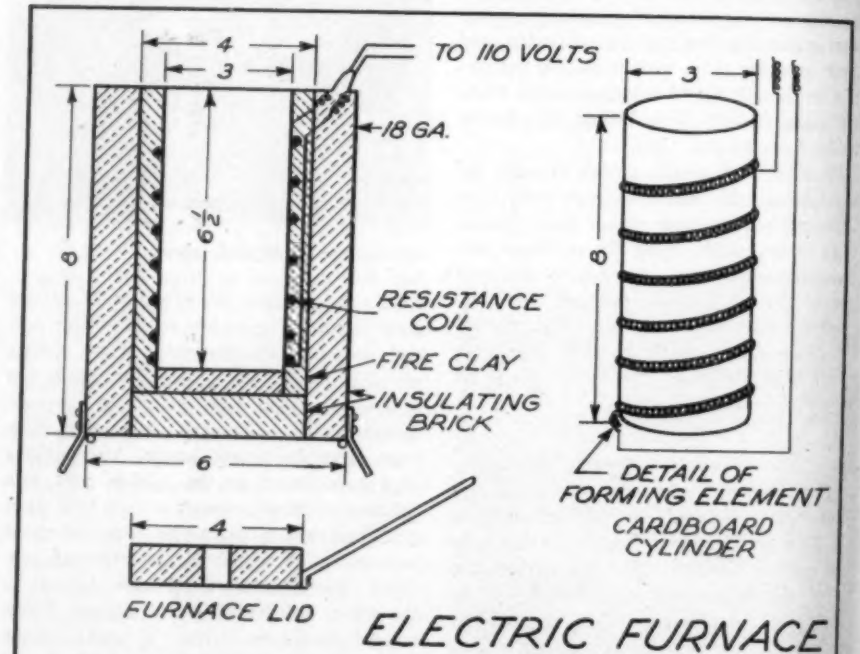
No program of industrial-arts is complete without some orientation in the foundry industry. This past year the National Foundrymen's Association has sponsored numerous events in an effort to encourage more young men to consider employment offered by the foundries as a career opportunity. The foundry, whether it be ferrous or nonferrous, is the basic industry of our manufacturing system.

The unit illustrated will serve well as a visual aid when used as a demonstration by the instructor. It is also quite serviceable and flexible enough to permit the students using it to cast small objects after doing the preliminary work preceding the actual casting. We use it in our shop to acquaint the students with all the processes involved — patternmaking, making the sand mold, pouring, etc. — before permitting them to enter the regular foundry unit. This allows for a better selection of students in foundry work by observing those who are most interested.

All of the equipment illustrated has been scaled down to correspond with the larger equipment to provide as much carry-over of information and techniques as possible.

After a demonstration of foundry practice, an excellent follow-up is a visit to a modern foundry while these relatively new terms are fresh in their minds. Most foundries will welcome the opportunity to show a group of students through their plant and explain in



ELECTRIC FURNACE

TABLE OF NICKEL-CHROMIUM ALLOY WIRE

WATTS	400	500	600	700	800	900	
AMPS	3.48	4.35	5.22	6.09	6.96	7.83	
GA.	FEET OF WIRE TO MAKE COIL						
18				43.5	38.1	33.8	
19			41.1	35.2	30.8	27.3	
20		38.9	32.4	27.8	24.3	21.6	
21		30.9	25.8	22.1	19.3		
22	30.4	24.3	20.3	17.4			
23	24.3	19.4	16.2				

Details of electric furnace for foundry unit

Foundry unit

detail many procedures which are impossible to reproduce in school.

A small electric furnace capable of melting aluminum (1400 degree Fahrenheit) may be constructed in the school shop with very little expense. The size may be varied to suit the need or the materials available to construct it. A table of electric resistance elements is shown on the working drawing of the furnace. The construction of the elements is very simple if careful attention is used when determining the size needed. The one illustrated needed 24 feet of No. 21 nichrome wire to produce a temperature of 1450 degree Fahrenheit in ninety minutes while operating on 700 watts.

The container may be made of 16 gauge steel or equivalent material with a diameter of 6 in. and a depth of 8 in. Add the appendages necessary for the handle and legs before assembling the furnace.

For the outer insulation use a light porous insulating brick such as is used in pottery kilns. Ordinary asbestos cement will not work in this design as the heat loss is too great and the furnace will not reach the desired temperatures. These bricks are easily carved to fit the furnace using a knife or small saw and the waste pieces may be used in the bottom of the furnace to a depth of about two inches.

Now construct the heating element referring to the table to obtain the proper length and size of wire. After this has been obtained there are several methods to wind it in a coiled shape. It may be done on a metal lathe using a quarter inch shaft about 2 feet long, or it may be wound by hand using the same shaft and keeping the other end held in a vise. Be sure and wind tightly. Leave about 1 foot of straight wire on each end for making connections to the source of power. After winding stretch out the coil to 5 or 6 feet.

Procure a cylinder as nearly 3 inches in diameter as possible. This should be of some destructible material in order to tear it from the furnace after the element has been molded in with fire clay. A glass cylinder or jar will work as it may be broken and the pieces removed separately.

Fasten the bottom of the coil securely leaving enough wire to reach the top and spiral wind the rest of the coil toward the top and again fasten securely. Place this in the furnace. There should be approximately three quarters of an inch clearance about this form in order to securely mold it to the insulation lining.

Use a mixture of half fire clay and half pulverized firebrick screenings mixed with enough water to make a stiff plastic mix. This is rammed about the form in very small amounts using much care not to displace the heating element. Be sure to fill around them however so that the unit will be held in place when the fire clay has dried.

Use this same mix to mold a cover about three quarters of inch thick of sufficient diameter to cover the furnace opening. A cork may be inserted to provide the hole to allow gases to escape when using the furnace.

Before the clay sets install the electrical fixture to receive the ends of the element. This one used the fixture from an old discarded electric iron. It makes an excellent method of control as a heater plug may be used which has a switch on it. Asbestos covered wire should be used as a cord to the source of current.

After the inner lining has dried for a day or so it is ready to use. The first few times will possibly take longer to reach the desired temperature due to the fact that the clay is not dry until it has baked thoroughly.

The accessories which accompany this unit may be varied to suit the particular requirements. The photograph of the unit described shows the most essential items of equipment along with the furnace.

The flask is made of plywood, 6 inches square by 4 inches deep. This was made in one piece, then sawed into on the circular saw to make a close fitting cope and drag. Self-locking hasps were used to hold cope and drag together securely while ramming the mold. A bench rammer may be made of any hardwood, turn each end down to 3 inches, then beveling one end with a handsaw. The pick-up tongs as well as the lifter must be made to fit the crucible used. The riddle is ordinary screen wire soldered to the bottom of a metal cylinder about 8 inches in diameter, by 2 inches high. A small bellows or a rubber bulb is necessary to blow away excess sand while making the mold. Trowels, slicks, and lifter may well be purchased as the proper use of these tools is a technique that should not be ignored.

The sand used should be of the kind used for aluminum casting. This along with some parting compound completes the essential items of equipment and material.

Supplement

The nichrome wire described in this article is manufactured by Hoskins Manufacturing Co., Detroit, Mich.

The insulating brick is No. K–20, Babcock and Wilcox.

SAFETY IN THE FORGE SHOP

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Although the number of schools which offer forge work as a part of their industrial-arts program is rather small, the author feels that safety regulations governing this type of work have a place in this series of safety articles. Whenever students work with fire, hot metals, hammers, and blowers, they must be properly instructed and made fully aware of the dangers and hazards. Some of the safety regulations follow:

1. Never harden the blunt end of a chisel or punch.
2. When doing heavy forging, always use goggles.
3. Never strike a hammer against the face of an anvil. (Hardened tool steel should never be struck with hardened tool steel.)
4. Keep the anvil face clear of scale.
5. Use only hammers which are securely fastened to the handle.
6. Before forging, be sure that the tongs are fitted to the job.
7. When forging, place tongs directly over the work. This serves as a protection against flying hot metal.
8. When tempering in oil, stand clear of a possible flare-up.
9. When sand is used to bend tubing, be sure it is absolutely dry.
10. Do not stand in line with the swing of anyone's hammer.
11. When cutting off stock or rivets, be sure

no one is standing in line with the flying pieces.

12. Mark hot metal pieces *hot* with chalk.

13. When putting work in or out of the forge, shut off the blast.

14. Never present work to be inspected while it is still hot.

15. When using cyanide in case-hardening, never breathe the fumes. (They are poisonous.)

16. Never light a gas flame when someone is standing near the source of the flame.

17. Be careful when using the compressed air hose. Never point the air nozzle at anyone.

18. No student should ever braze, weld, or solder tanks which have contained gasoline or any other explosive liquid.[1]

[1] *Safety Standards and Recommendations for School Shops*, published by school district of Lancaster, Pennsylvania, 1934, pp. 66–67.

SMOKING STAND WITH PIERCED HELICAL SPINDLE

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Last year one of my students asked for some help in incorporating a pierced helical spindle into a smoking stand. Figure 6 shows the result. This departure from the usual thing engendered a lively interest in this phase of turning woodworking. Another student made a floor lamp employing the pierced spindle motif with gratifying results.

Any medium hardwood lends itself to piercing. Such woods as cherry, mahogany, gum, and poplar are easy to work and finish well. Beginners would do well to avoid using birch or maple because of their hardness and their resistance to the ordinary abrasives. Eye appeal may be enhanced by using contrasting color effects with the spindle made of one type of wood and the base and top made of another. The spindle might be made by gluing strips of contrasting colors. It is well to use one of the newer moisture resisting glues to insure a lasting joint.

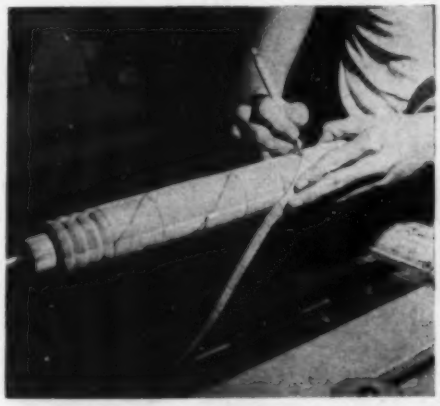

Fig. 1

Fig. 2

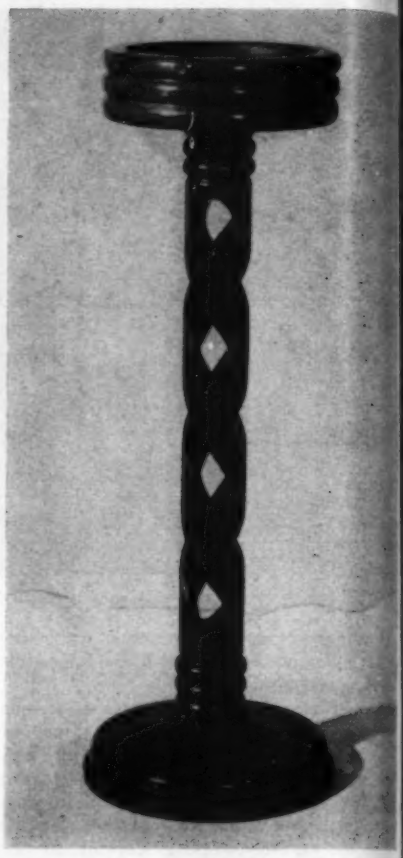

Fig. 6

After turning the spindle to the proper diameter (see Fig. 7), the tenons are cut. Care must be exercised to match the tenon with the hole that is to receive it. The beads are then turned in the conventional manner. The helix is then laid out on the remainder of the spindle. By making use of the inde

Fig. 3

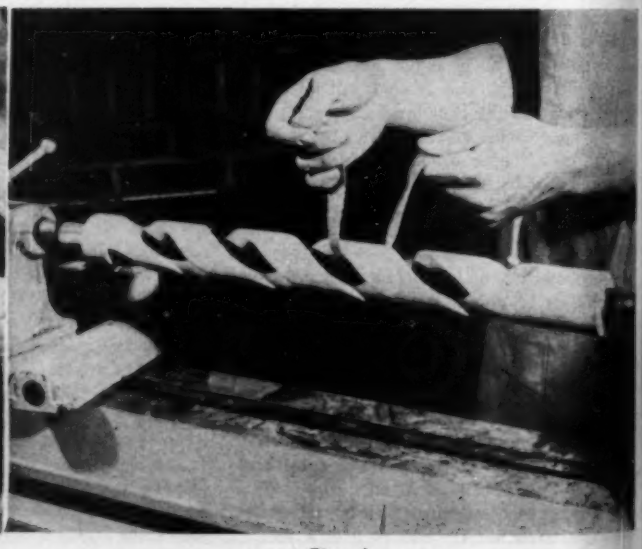

Fig. 4

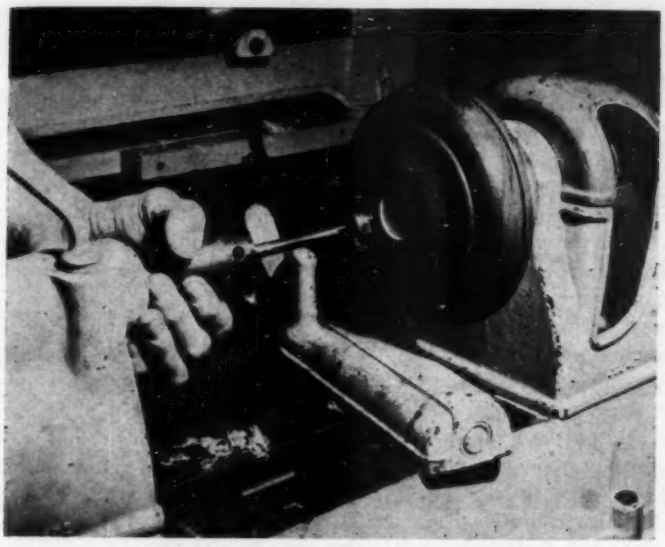

Fig. 5

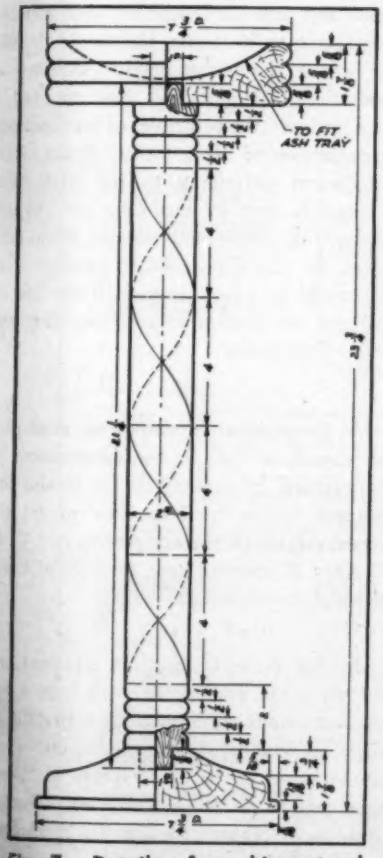

Fig. 7. Details of smoking stand with pierced helical spindle

head within the headstock, divide the spindle along its axis into two parts. The length of the spindle is then spaced off, using the spindle diameter as the distance between these lines. See Figure 1. Two helixes are drawn, one starting directly behind the other. The helixes progress along the shaft two spaces for each one-half revolution, as shown in Figure 1. Holes are bored along one spiral, making sure to set the depth gauge for a little more than half the thickness of the wood. When bored from the opposite side the holes should meet. A *V* block clamped to the drill press table will help to insure accuracy. A Forstner bit has given more satisfactory results than the regular machine bit for this operation. See Figure 2.

The inside of the helix may be roughed out as shown in Figure 3. If a tool of this type is not available, use a bent gouge, chisel, or like cutting tool. This is followed, as shown in Figure 4, with strips of abrasive cloth. Care must be exercised at this point to obtain a smooth surface for the finishing operations.

The top of the smoking stand is cut to receive an ash tray, such as may be obtained in any five-and-ten-cent store, or one that can be hammered out of copper or similar material. The hole in the base may be bored as shown in Figure 5. The assembled stand is ready for finishing. A desirable finish is obtained by using a series of coats of shellac rubbed down after each application.

It has been most interesting to observe the reactions of people as they see the completed job. Needless to say they are intrigued and their remarks have been most complimentary.

PRESERVING EDUCATIONAL GOALS

(Continued from page 139)

character education its rightful position in the school curriculum when he said:

> The entire object of true education is to make people not merely do the right things, but to enjoy them, not merely industrious, but to love industry, not merely pure, but to love purity, not merely just, but to hunger and thirst after justice.

Vocational Guidance

Before teachers can do an adequate job of guiding youth into their proper vocations they must know more about the world of work. The teacher who has worked in industry has something real to offer his students. Such a teacher visits industrial plants often, keeping abreast of the times, not only in his special field, but in related fields as well. No teacher can neglect his contacts with the workaday world; the changes are rapid and challenging; obsolete methods have no place in our schools.

In the matter of vocational guidance, we have some very definite responsibilities. Too often industry tells us that our young people do not seem to know what they want to do, let alone being able to do something definite. Surely our immediate responsibility is to develop in our youth some abilities which they can sell as they leave our secondary schools, trade schools, vocational schools, and certainly, as they graduate from our colleges. Character and marketable ability rank high, and rightfully so, in the demands of most employers.

Our schools can do much more than they are doing. Tryout courses in a goodly variety of subjects should be offered. Tests alone, important as they are, seldom tell a boy where he should go and what he should do. When the student has gained some definite knowledge about himself based largely on sound tryout, he should have the opportunity to pursue further the subject in which he has succeeded, which he likes, and which interests him. Otherwise, why have tryout courses? Wherever practical, schools should take the initiative in making it possible for boys to work part time in some business or industry. A functional vocational guidance program in a well-equipped and well-staffed school, coupled with experience in industry for as many deserving students as possible, constitutes the ultimate in job preparation. We, as educators, have not shouldered our responsibilities adequately in this regard until we have done the following:

1. Provided a creditable exploratory program in our schools.

2. Made it possible for the student to develop salable skills in his chosen field.

3. Helped him to discover for himself his abilities, as well as his shortcomings.

4. Assisted him in ascertaining what the vocation of his choice demands if one is to succeed in it.

5. Checked to see that the pupil's interest in the chosen vocation is very real, based upon valid information regarding his personal assets and the demands of the vocation.

6. Helped the student to match his abilities with the demands of his chosen calling in so far as that is possible.

7. Investigated with him the matter of supply and demand in his chosen field, never forgetting the concept that there is room at the top for those who are willing to pay the price.

8. Impressed upon him the importance of the will to do.

9. Assisted him in identifying the obstacles to be overcome in terms of money, time, effort, and the preparation necessary if one is to succeed in the vocation of his choice.

10. Had the pupil investigate a goodly number of other vocations besides the one which he has chosen.

11. Helped him prepare for, find, and make progress on the job, which means follow up activity on our part.

POST HIGH SCHOOL EDUCATION

(Continued from page 145)

tional and adult schools are less likely to allow purely academic consideration to sway them from serving these distinctive purposes than will any other unit in the post-high school system. This belief has led it to recommend allocation of the junior college terminal function to the vocational school rather than to the new college of liberal arts and sciences proposed or to the University of Wisconsin Extension Service.

It is a fact that post high school programs have been established and are being operated by both the system of vocational education and colleges and universities of this country. It would, however, be unfortunate if a competition develops which results in a mad race for one or the other institution to "corner the market" in this highly important educational development. Accordingly, there is a great need for co-operation and understanding between the system of vocational education and colleges and universities regarding the part that each may play most effectively in this important phase of the educational life of the locality, the state, and the nation. An unhealthy competition might result in harm to all institutions and a retardation of the needed development in the areas which we are discussing.

I have already pointed out that many vocational schools in this country have established specific course offerings on the post high school level, and because other educational agencies are developing and expanding programs of a noncredit character, a great deal of co-operation and co-ordination must exist in order that there may not be undue duplication in the offerings of the respective agencies. Conferences should be held on the local level between administrators of programs of vocational education and administrators of programs operated by other educational agencies to the end that the offerings in each community may be properly co-ordinated.

On the state level, meetings to discuss program development and objectives should be held at regular intervals with the administrators of respective programs to establish over-all policies. These conferences should be conducive to an understanding of objectives and an orderly development of new programs on the local level. Such conferences have been held with the president of the University of Wisconsin with the objective of acquainting the top administration of that institution with the developments which had been made and are contemplated by the vocational education system on the post high school level in our state.

Great concern frequently exists regarding the so-called "overlapping of programs" which provide educational opportunities. Dr. Cooley, the late director of the Milwaukee Vocational School, aptly discussed this question pointing out that the cloth at the seams of a well-made coat overlap. If there were no overlapping in the seams of the coat it would not be a satisfactory garment. It may be necessary for educational programs and activities to overlap to some degree in order to provide complete and satisfactory coverage for our entire population.

We have a responsibility in the further development of programs on the post high school level to effect a co-ordination and a co-operation between vocational education and other educational programs and agencies to the end that through effective co-ordination adequate services will be developed through our individual or joint efforts.

CORRELATING RELATED TECHNOLOGY

(Continued from page 151)

counter in their daily shopwork but should have a good basic foundation in the mathematics that is required of the student in his trade. This includes applications of general shop mathematics, algebra, solid geometry, trigonometry because any or all of this may be needed to perform the various jobs that he will be called upon to do in the shop. In the field of science, he should know the various kinds of metals, their composition, how they are made, what they will do under different conditions, what heat treatment will be necessary if any, what feeds and speeds should be used, etc., also how lubricants are made, what they are composed of and when and which ones should be used for the various jobs. All students should be able to make and read any and all blueprints and sketches pertaining to his trade. He should be able to process a job completely (sequence of operations). Understand how to start a new business, the principles of management, organization of departments, services, and equipment pertaining to his trade. The human factors in business, how to get along with people and manage them. Also what he can expect while growing from a student to a businessman. These are all part of our system of teaching shop and related technology.

As professional educators, we must play an important role in the development of educational programs, but it is also important for us to take time to get the sound advice of the lay public. . . . *C. L. Greiber, Wisconsin State Director of Vocational Education.*

* * *

In the present unsettled situation, we do not know whether we shall have a war on our hands in a matter of months or days; or whether there stretches out before us a period of 10 or 15 years of "semi-emergency." . . . *W. E. Patterson, Director, Bureau of Apprenticeship, U. S. Department of Labor.*

* * *

Teaching of *know why* is as important as teaching of *know how* in the educational job that faces American schools because of the international crisis. . . . *Dr. Francis J. Brown, Staff Associate, American Council on Education.*

FIGHT WASTE

IN PEACE, WASTE IS A SIN...
NOW—WASTE IS A CRIME!

Save vital tools and supplies—

DISSTON® FURNISHES INSTRUCTION MATERIAL *FREE!*

The national emergency brings with it a vital need to stop waste of essential tools, materials, and manpower. Now, the new Disston "*Fight Waste*" Program shows the way—gives you a concrete plan to follow in your classroom!

ENDORSED BY GOVERNMENT!

Commenting on the Disston "*Fight Waste*" Program, Mr. H. B. McCoy, Assistant Administrator, National Production Authority, writes:

"The program . . . is in direct support of the national need for conservation of materials and equipment. . . . We are most anxious to increase productive efficiency as well as production capacity. We are looking forward . . . to the beneficial effects of the efforts of your company in this direction."

INDIVIDUAL INSTRUCTION CARDS FOR YOUR STUDENTS

These cards cover 31 different kinds of cutting tools—contain expert information and recommendations on the proper choice, correct use, and best care of each type. You'll find them a valuable and practical aid in instructing beginners, speeding training, improving workmanship, and in lengthening useful life of your equipment. You can get a supply of these cards *free*—without cost or obligation—whether or not you are a user of Disston Tools. Use the "Pocket Foreman" Manual as a guide in selecting cards.

ALSO: New "Fight Waste" edition of Disston Saw, Tool & File Manual. Chapters on how to choose and use popular workshop tools; how to sharpen and refit saws; proper care of tools; how to choose suitable woods. Sent FREE on request!

Use quality tools for longer tool life!

DISSTON TOOLS FOR THE CLASSROOM: Hand Saws, Hack Saw Blades and Frames, Files, Bevels, Gauges, Squares, Circular Saws, Dado Heads, Band Saws, Wood Turning Chisels. Also Practice Filing Blades. Complete information and prices on request.

GET COMPLETE INFORMATION on the Disston "Fight Waste" Program. Write today or use the coupon!

VALUABLE MANUAL—
"The Pocket Foreman"

Reproduces all 31 Instruction Cards pictured above. Also tells how to get the most out of the "Fight Waste" Program in your shop. Free copy will be sent on request—use it to determine type and quantity of individual cards required.

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Show How to Use Tools Right!

Proved in classroom use! Big, informative charts, illustrated with "how-to-do-it" photos and diagrams. Supplied without cost.

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WALL CHARTS:
☐ How to use a Hand Saw
☐ How a Hand Saw Cuts
☐ Hack Saw Chart
☐ Choosing and Using Files
☐ Wood Turning Chisels
☐ Special Purpose Saws

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SCHOOL_____

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No. 118—two-speed breast drill with built-in level. Perfect for school-shop use. Extensible crank — ball-bearings.

No. 2 — One of the most popular hand drills ever designed. Sturdy, smooth-acting, built for lifetime performance.

No. 104—newest addition to the Millers Falls line. Enclosed gears, "Oilite" spindle bearing—unbreakable, glossy red "Tenite" handles.

No. 185A—formerly the world-famous "Mr. Punch"—now even better with a new, quick-acting, positive-lock chuck.

No. 100 — a beautiful new tool with all the time-tested features that have made Millers Falls Automatic Drills such favorites.

Here are the Leaders in the Finest Drill Line Made

MILLERS FALLS TOOLS SINCE 1868

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MILLERS FALLS COMPANY • GREENFIELD, MASS.

ASSOCIATION NEWS

(Continued from page 6A)

In addition to Dr. Perry there will be an address at the Thursday morning session from Lyndon H. Strough, superintendent of schools at Rome, N. Y.

Another significant feature of the program will be a color motion picture presented by the Ford Motor Company on the subject of the National Industrial Arts Awards.

There also will be a spinning demonstration by one of the world's finest spinning craftsmen, George Shapeland of Cooperstown, N. Y. He will demonstrate all of the tricky and difficult types of spinning with cold rolled steel, brass, copper, and aluminum.

More than 25 manufacturers and distributors of industrial-arts materials will exhibit their wares at the conference.

There will be two noon luncheons, a master teachers' meeting, and an Epsilon Pi Tau breakfast to serve as a reunion for those who attend. Administrators, teachers, and interested persons are cordially invited to attend this conference.

CONFERENCE AT MANKATO STATE TEACHERS COLLEGE

On Thursday, February 1, 1951, the Industrial Arts Club of the Mankato State Teachers College was host to the Industrial Arts and Vocational Education teachers of Mankato Minn., and the surrounding counties at a dinner and evening conference.

Dr. Homer J. Smith of the University of Minnesota was the guest speaker.

About eighty people attended the dinner and conferences.

The officers of the College Industrial Arts Club are: Lovern Nauss, Faribault, president; Robert Chase, Madelia, vice-president; Lester Westenberg, Edgerton, secretary; Gordon Oldenburg, Gaylord, treasurer; and Maurice J. Nelson, Mankato Teachers College, sponsor.

Other members of the industrial-arts faculty at State Teachers College, Mankato, are: Dr. C. J. Gerbracht, L. B. Bjornstad, and Ira Johnson.

CONFERENCE ON SCIENCE, TECHNOLOGY, AND WORLD RESOURCES

As part of Northwestern University's year-long centennial observance, a conference on science, technology, and world resources was held on the Evanston campus on February 28, and March 1 and 2.

This conference brought together outstanding physical, biological, and social scientists, representative of the foremost thinkers and workers in their respective fields.

Among those who participated were Gordon Dean, Chairman of the U. S. Atomic Energy Commission, who discussed "The Role of Atomic Energy in the World Economy"; Frank Notestein, director, Office of Population Research, Princeton University; and Dennis Fitzgerald, director, food and agriculture division, Economic Co-operation Administration, who gave a talk on "World Needs and Resources."

Other men who participated in the conference are Norris Rakestraw, professor of chemistry at Scripps Institution of Oceanography; Robert E. Wilson, chairman of the board, Standard Oil Company (Indiana); and Lawrence Haystad, director of reactor development, U. S. Atomic Energy Commission. — *Edward H. Stromberg.*

SOUTH DAKOTA INDUSTRIAL EDUCATION ASSOCIATION

During the state convention of the South Dakota Education Association held at Rapid City, S. Dak., the industrial-arts group and the trades and industries group combined to form the South Dakota Industrial Education Association.

Officers for the next biennium are: president, Roy Sterrett, Brookings, S. Dak.; vice-president, O. H. Schwentker, Rapid City, S. Dak.; secretary-treasurer, Warren Messman, Aberdeen, S. Dak.

A constitution for the South Dakota Industrial Education Association is now being developed so that interested persons may better understand the purposes of the organization and to make the efforts of the members more effective throughout the state.

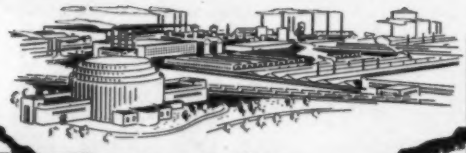
PRINTING TEACHERS GUILD CELEBRATED PRINTING WEEK

On Friday evening, January 12, 1951, the teachers of graphic arts in all branches of the New York educational system held their Franklin Week meeting at the offices of Harris-Seybold Company, 380 Second Avenue, New York City. One of the features of the evening was the Guild's tribute to the modern Ben Franklins — the printing employers of today. Each member invited one of his former employers in the trade to be a guest.

With the co-operation of T. M. Broadston and

(Continued on page 18A)

TEACHERS! Here's how you can win an EXPENSE-PAID TRIP TO DETROIT



Some of the thousands of projects entered in the I.A.A. competition last year. Entries showed great variety and skill.

Judging 1950 I.A.A. projects. Qualified judges were selected for technical knowledge and experience.

1951 FORD INDUSTRIAL ARTS AWARDS PROGRAM

HERE IS an outstanding opportunity to draw attention to the excellence of the work being done in your school shop or drawing room and, at the same time win an expense-paid trip to Detroit!

Any of your students in the 7th through the 12th grade, who are not more than 20 years old, and who are taking a shop, printing or drawing course may enter the I. A. A. competition. There is no entry fee. Your signature, as instructor, on official entry blank is all that is required. If one of your students' projects wins an Outstanding Achievement Award—and there are NINE of them nationally—*you* automatically win a trip.

The more worth-while projects entered by students in the I. A. A., the better chance you have to win recognition and make the trip to Detroit.

NINE MAJOR DIVISIONS—Wrought Metal . . . Patternmaking and Molding . . . Machine Shop . . . Woodworking . . . Plastics . . . Electrical . . . Mechanical Drawing . . . Architectural Drawing . . . Printing . . . and there is an open division for projects which do not fall into above classifications. Judging will be done at regional level only in this division.

WRITE FOR FULL DETAILS

FORD MOTOR COMPANY—INDUSTRIAL ARTS AWARDS
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Please send me the 1951 Rules Handbook and ____ Entry Forms.

Name _____
(Please type or print)

Address _____

City _____ Zone ____ State ____

I am a teacher in _____
(Name of School)

Here is the I.A.A. Certificate of Award that goes to teachers whose students win national awards —formal recognition of achievement in your profession.

HOW TO ENTER YOUR STUDENTS—Write for official entry blanks. Have students fill out completely. Attach entry blanks to the projects and ship via prepaid Railway Express to the appropriate regional center—Philadelphia, Kansas City or Los Angeles. Your signature *must* be on each entry blank.

AWARDS—Regional awards are $10.00 in cash, a certificate and automatic entry in the national finals for each of the eight winners in each GROUP —440 such awards in each region. National awards in each of the 56 GROUPS are: first, $100; second, $75; third, $50; and four honorable mentions of $25 each. In addition, an Outstanding Achievement Award is given in each of the nine major DIVISIONS.

INDUSTRIAL ARTS AWARDS
Sponsored by
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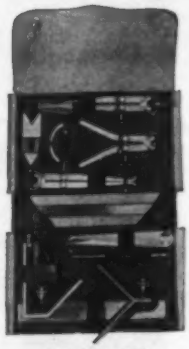
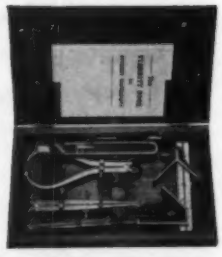
When You Select
Starrett SETS OF TOOLS

SET NO. 902B
A more complete set for students and apprentices. Contains a 1" micrometer, 12" combination square with center head, center gage, center punch, 6" flexible steel rule in case, 4" divider, 4" inside caliper 4" outside caliper and 4" hermaphrodite caliper. Simulated leather folding case.



SET NO. 900
The basic tools at minimum cost. Contains 6" combination square complete, 6" flexible steel rule, center gage, center punch, 4" divider, 4" inside caliper, 4" outside caliper and 4" hermaphrodite caliper. Simulated leather folding case.



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A practical, economical "package"— contains 6" combination square complete, 6" flexible steel rule in leather case, center gage, center punch, 3" divider, 6" outside caliper and 6" inside caliper plus The Starrett book for Student Machinists—all in a sturdy, compact, nicely finished wood case.

All the measuring tools your boys need for most modern shop projects . . . in compact, convenient kits that are easy to store and issue. Starrett sets provide a simple way to prevent loss or damage and save valuable instruction time. What's more, they contain genuine Starrett Tools, selected on the basis of long experience with vocational education needs. And the best of all, they are priced to fit the slenderest budget. Ask your Starrett Tool Distributor—or write for complete information. Address Dept. "CE."

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ASSOCIATION NEWS

(Continued from page 16A)

J. H. Johnston of the Harris-Seybold Company, demonstrations of the latest offset presses and other equipment were given. A color film describing the offset technique also was shown.

Following the business meeting, the new Guild officers were elected for 1951. They are: Bob Cynar, president; Max Kirschner, vice-president; Don Manfre, secretary; and George Halpern, treasurer. Buffet refreshments were then served.

MU SIGMA PI INITIATION

The Mu Sigma Pi Fraternity, an honorary graduate fraternity of Wayne University, Detroit, Mich., initiated eight candidates into its ranks of members on December 8, 1950.

The initiation banquet was held at Dearborn Junior College, Dearborn, Mich. The address of the evening was delivered by Brother Albert Sobey of General Motors Institute. Brother Sobey is a veteran of education in industry and his topic, "A Veteran Looks at Industrial Education," presented a lesson and a summons to the younger men that only a master educator of many years' experience could give.

See picture of initiates on page 4A of the March, 1951, issue.

OKLAHOMA VOCATIONAL ASSOCIATION MEETING

The annual meeting of the Oklahoma Vocational Association was held at Oklahoma City, Okla., in conjunction with the Oklahoma State Teachers meeting on November 13, 1950.

Dr. M. D. Mobley addressed the group. He spoke on "The Place of Vocational Education in Strengthening Democracy."

During business sessions, a completely revised constitution was adopted.

New officers elected for 1951 are as follows: Otis Adams, Wetumka, president; Ralph Dreesen, Guthrie, vice-president, agriculture; Joanna Chapman, Stillwater, vice-president, home economics; M. J. DeBenning, Stillwater, vice-president, distributive education; Tom Wyatt, Ponca City, vice-president, trade and industrial education; and Hugh D. Jones, Stillwater, secretary-treasurer.

NATIONAL ASSOCIATION OF INDUSTRIAL TEACHER TRAINERS COMMITTEE

On October 30, 1950, the National Association of Industrial Teacher Trainers Committee working on co-operative college curriculums for the preparation of trade and technical teachers met at Wayne University.

Members of the committee are: Professor Dewey Barich, chairman of the department of industrial education, Kent State University, Kent, Ohio; Dr. Stanley Drazek, assistant dean of special and continuation studies, University of Maryland, Baltimore, Md., Dr. J. W. Giachino, assistant director of vocational teacher education, Western Michigan College of Education, Kalamazoo, Mich.; Professor C. E. Highlen, department of trade and industrial education, Purdue University, Lafayette, Ind.; and Dr. G. Harold Silvius, Professor of industrial teacher education, Wayne University, Detroit, Mich. Dr. Silvius is serving as chairman of this committee.

REHABILITATION THERAPISTS MEET

The annual convention of the American Association of Rehabilitation Therapists will be held at the Phoenix Hotel, Lexington, Ky., June 14, 15, and 16. All those interested in rehabilitation are invited to attend. Reservations for rooms or exhibit space may be sent to Joseph Harris, 844 Meadow Lane, Lexington, Ky.

A.V.A. PUERTO RICO CHAPTER

At the A.V.A. Puerto Rico Chapter Convention, held recently in Mayagues, Puerto Rico, the following were elected to the board of directors for 1951: Dr. Frank C. Urgell, president; Victor Jordan, vice-president; Ivan Vega Brau, secretary; Juan Perez, treasurer; Nicolas Hernandez, vocational agriculture representative; Hilda Santana, home-ecomonics representative; Gladys Munoz, business education representative; Luis Castellano, trade and industrial representative; Francisco Nunez, industrial-arts representative; Zenaida C. Bonilla, guidance education representative; and Manuel Rodrigues, vocational rehabilitation representative.

♦ The 1951 convention of the New York State Vocational and Practical Arts Association will be held in Rochester at the Powers Hotel, April 12–14. Verne Bird, assistant superintendent of schools in Rochester, is general chairman.

* * *

The first collapsible tube, forerunner of tooth paste and shaving containers, was patented in 1841 by James Rand, an American. Aluminum collapsible tubes were first manufactured in this country in 1920.

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TEACHING PRINTING...

THE vocational student of today is the craftsman of tomorrow. His ability to handle commercial printing equipment then will depend on how practical is the press he learns on now. It is for this fundamental reason that the 12" x 18" ATF Little Giant is so remarkably adapted for teaching fine letterpress printing. It offers such a breadth of practical training that its modest investment is readily justified. The ATF Little Giant is widely used in commercial shops, and includes every cylinder press facility that the future craftsman will meet in shop practice.

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"UNITS IN SHEET METALWORK"

By Robert E. Smith. A first course. Many illustrations show correct procedures and give related information on processes and occupations. Safe working procedures are stressed. This book covers the several machines and includes several projects. $1.

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By Robert E. Smith. Elementary bench metalwork with special emphasis on layouts, correct use of tools and equipment, and safety. Several suggested projects. $1.

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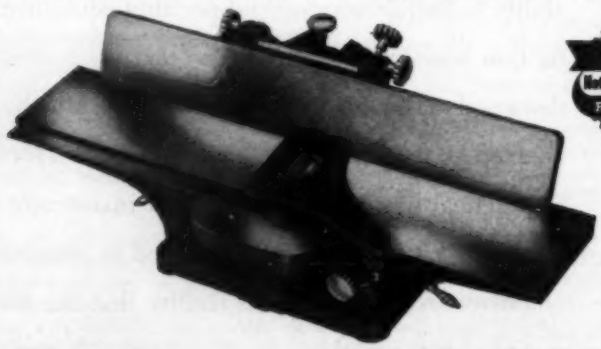
If you want advanced features, increased dependability and maximum safety at lowest cost — choose a Duro Jointer! The host of quality features include: a heavy cast, rear mounted safety fence; a cutter head with 3 high speed blades and grooved chip breakers for fast, clean cuts; heavy cast iron tables which adjust quickly, accurately; a cutter head guard for safety which swings back automatically; adequate rabbetting capacity — and many more time and labor-saving advantages.



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3 MODELS TO FIT ALL SCHOOL BUDGETS

Select the Duro Jointer that fits *your* school workshop . . . 3 new models — 4½", 5" or 6" capacity. Designed to fit every need and budget.

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Your Dual Purpose Eldoradostat for April

Here's a half-picture peek at another Eldoradostat designed to do double duty in the classroom . . .

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★ The *ALL-NEW* Blueprint reading question and answer service! Every solution to the Eldoradostat problem will have questions and answers designed for use in blueprint reading classes.

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3. With Dixon's exclusive *Leadfast* process the lead is held fast in the wood. Lead and wood are unified! You get true sharpening without splintering or burring!

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Personal News

ROBERT D. DOLLEY PROMOTED

Promotion of Robert D. Dolley to the newly created position of assistant superintendent of schools in charge of vocational education has been announced by Supt. James T. Wilson and the Board of Public Instruction of Dade County (Miami), Fla., effective as of January 10, 1951.

Plans for an expanded program of vocational education in Miami and Dade County call for appointment of a local director of vocational education and three assistant directors to work under Mr. Dolley's supervision. These four positions have not as yet been filled.

Well known to vocational educators throughout the United States, Bob Dolley has devoted a quarter of a century to trade and industrial and distributive education, having spent all this time in the Florida public school system with the exception of 18 months in the Republic of Panama, where he represented the U. S. Department of State, through the Institute of Inter-American Affairs, as director of the Servicio Cooperativo Inter-Americano de Educacion.

Dolley entered upon his career as an educator in 1924, in the public schools of Jacksonville, Duval County, Fla. Moving from classroom teaching to supervision, in 1930 he became director of vocational education for Duval County. From this position he went to the State Department of Education in Tallahassee in 1937 as state supervisor of trade and industrial and distributive education. He held this position until his appointment as special representative and chief of a field party to the Ministry of Education in the Republic of Panama.

During his tenure of office as state supervisor of trade and industrial and distributive education, Dolley inaugurated and directed the University of Florida School of Trade and Industrial Education at Daytona Beach for eight summers, bringing into the state some of the finest teacher-training talent in the nation to serve the needs of teachers and prospective teachers from 38 states and Puerto Rico. *Reader's Digest* featured this unusual teacher-training school in its April, 1939, issue.

Robert D. Dolley, assistant superintendent of schools in charge of vocational education in Dade County, Fla., and a visiting educator from South America

During this period Dolley also brought the program of diversified co-operative training, which he pioneered during depression years, to its full development and saw it expand throughout the South as a result of training offered during the summer sessions at Daytona Beach.

During World War II, Dolley brought national recognition to Florida for the outstanding war production training program which he planned and supervised. At the close of the war training period, he secured for Florida vocational schools the fine equipment purchased from federal funds for war training programs in the public schools and immediately reorganized the school shop programs throughout the state on a peacetime training basis that brought the reputation of vocational training in Florida to a new high.

While stationed in the Republic of Panama, Dolley was invited by the Board of Public Instruction of Dade County, Fla., to return to the state to become director of vocational education for Miami and Dade County, and he served in this position from December, 1947, until July, 1950.

From September through December, 1950, Dolley filled a position as special assistant to Dr. Bowman F. Ashe, president of the University of Miami, working with him on plans for develop-

(Continued on next page)

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The amplidyne is an important equipment in industry today, contributing greatly to the accuracy, speed of response, and flexibility of control and regulating systems. The availability of seven different control fields on the educational amplidyne generator permits a wide variety of experiments, such as:

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- Load-voltage characteristic studies
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For further information, write for bulletins GEC-599B (Amplistat) and GEC-590 (Amplidyne), Section B687-67, Apparatus Department, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

687-67

PERSONAL NEWS

(Continued from previous page)

ment of a junior college system for the Greater Miami area. Long an advocate of the junior or community colleges, Dolley has looked forward to this post-high school program in the planning of vocational training facilities.

Bob Dolley received his B.S. degree from Bradley University, Peoria, Ill., and took graduate work at the University of Tennessee and at Harvard University in testing and guidance. In 1934, he received the M.S. degree from Colorado State College, Fort Collins, where he majored in industrial and vocational education.

As professor of vocational education, he has taught in summer sessions at Montana State College (1945); Florida State University (1948); and Mercer University, Macon, Ga. (1950).

Bob Dolley is the first educator in Florida to be appointed assistant superintendent of schools in charge of vocational and adult education; first to have operated a Summer School of the University of Florida off the main campus; and the first educator in Florida to hold a life membership in the American Vocational Association.

A director of the American Technical Education Association, Dolley is past president of International Chapter Iota Lambda Sigma, honorary industrial education fraternity; of the University of Florida Chapter, Eta Mu Pi, national honorary retailing fraternity; of Florida Vocational Association; and of the National Association of State Supervisors of Trade and Industrial Education.

In civic life, he is president of the All American Air Maneuvers and of the Greater Miami Aviation Association. He is married, has one son, Bob Dolley, Jr., and resides in Coral Gables, Fla.

DANIEL H. SHAY RETIRES

On October 31, 1950, after thirty years of service with the vocational division of the Massachusetts Department of Education, Daniel H. Shay retired from active duty as assistant director.

His service in the field of vocational education began with his appointment as instructor in the cabinetmaking department of the Springfield Trade High School, September, 1911.

Returning from service as an army captain in World War I, Mr. Shay entered upon his long career with the Massachusetts Department of Education in 1921. During his tenure with the department he has served as assistant director of the division of vocational education, administrative supervisor in charge of trade and industrial education in state-aided schools, administrator of the Massachusetts war production training program, executive agent for the Massachusetts board of collegiate authority and veterans' training program, president of the Vocational Educational Society of Boston, president of the National Association of State Supervisors of Trade and Industrial Education, county commander of the American Legion, state historian of the American Legion, and chairman of the School Committee in North Reading, Mass.

Upon his retirement, Mr. Shay was tendered a series of testimonial observances, including one by his immediate associates in the Department, and another by the Commissioner of Education and the entire staff of the State Department of Education. At a luncheon given by the Massachusetts State Directors, Mr. Shay was presented with an engraved scroll.

RECEIVES THE DOCTOR OF EDUCATION DEGREE

William E. Huss, supervisor of industrial arts student teaching at the State University of New York's Teachers College at Oswego, received the doctor of education degree at The Pennsylvania State College Commencement on January 27, 1951.

Dr. Huss was graduated from the Utica (N.Y.) Academy, The Oswego State Teachers College, and The Ohio State University with a bachelor of science degree. A part of his graduate work was conducted at The Ohio State University where he earned a master of arts degree.

His teaching experience includes service at York Central School, Cobleskill Central School, and wartime service as instructor at the U. S. Merchant Marine Academy at Kings Point with a rank of Lt. (jg) USMS. He served on the staff at the Oswego (N. Y.) State Teachers College since 1939 and is now assistant professor of industrial-arts education serving as supervisor of off-campus teaching in industrial arts.

He has engaged in professional activities which include frequent lectures on industrial-arts principles and practices featuring color slides of industrial-arts shops in action. Some of these presentations were made to state professional associations at conferences in Indianapolis in 1947, New York in 1947 and 1948, and Pennsylvania in 1950.

He has contributed professional magazine articles appearing in the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine, *School Shop* magazine, and *Viewpoint* magazine. He assisted in the preparation of a textbook by photographing exemplary practices in industrial arts.

(Continued on page 24A)

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PERSONAL NEWS

(Continued from page 22A)

Dr. Huss is cosponsor of Phi Chapter of Epsilon Pi Tau, international professional honorary fraternity. He is a member of Phi Delta Kappa and Iota Lambda Sigma, professional education fraternities. He also holds membership in the American Association of University Professors, Association of the New York State Teachers College Faculties, American Vocational Association, and the American Industrial Arts Association.

♦ O. Stanley Swandahl has been appointed district manager for Lake County, Ill., and various trading areas of Wisconsin, for the entire DeWalt line of cutting machines for the woodworking, metal, and plastics industries in the trading areas of Green Bay, Oshkosh, Madison, Milwaukee, Racine, Sheboygan, Appleton, Fond du Lac, Janesville, and Kenosha, and the Lake County area in Illinois.

♦ Dr. Joseph R. Strobel, professor of industrial education at Ohio State University, predicts that the number of Ph.D. candidates in industrial arts and trade industrial education will remain normal throughout the spring and summer quarters. The industrial education majors now completing residency requirements include: Lawrence Borosage, assistant state supervisor of trade and industrial education, Columbus; George Brandon, consultant in public service education, Ohio State University; Thomas Eachus, industrial-arts education instructor, Ohio State University; Harold Gilbert, industrial-arts education instructor, State Teachers College, Oswego, N. Y., and Robert Mansfield, industrial-arts education instructor, Ohio State University.

♦ Dr. Paul E. Klopsteg, director of research at Northwestern University's Technological Institute, has accepted an invitation to assist the University of Punjab in modernizing and expanding its science and engineering departments.

He will leave Chicago, March 4, by plane for the West Coast, then to Hawaii, next to either Tokio or Manila, and finally to New Delhi, arriving there about March 13.

♦ Walter Durbahn, director of industrial education at Highland Park, Ill., high school for 26 years, recently received a TV award for his telecast, Walt's Work Shop, over WNBQ.

Mr. Durbahn has already won three TV awards for his program. In 1949 it was chosen by the Chicago Federation of Advertising as the "Best Instructional Show." In 1950, the program was selected for the yearly "Educational Award" and this year the Work Shop has been named best "How-to-do-it-Show."

In addition to heading the industrial education department at Highland Park, Mr. Durbahn teaches the Lake County Carpenter Apprentices two nights each week.

♦ Lewis P. Favorite has been named manager of Aluminum Company of America's New York District Sales Office, succeeding Edward B. Wilber, who has been elected president of American Lumber & Treating Company at Chicago, Ill. Mr. Favorite assumed his new duties March 1.

♦ Dr. Ralph G. Owens, Park Ridge, Ill., has been named assistant dean of engineering at Illinois Institute of Technology.

Dr. Owens, who has served as professor of mechanical engineering at Illinois Tech since 1946, replaces Chester A. Arents, who was recently named co-ordinator of research.

♦ Dr. Ralph G. Iverson has been appointed director of student personnel services and teacher of guidance at The Stout Institute, Menomonie, Wis.

♦ Dr. E. R. Plowden, former Alabama state supervisor of trade and industrial education, is on leave of absence from his position as teacher trainer at the University of Alabama. He has accepted a year's assignment as consultant to the Ministry of Education, Republic of Brazil. He will assist the Brazilian government in setting up a program of vocational education, after which he will return to the University of Alabama. He may be reached in care of the United States Embassy, Rio de Janeiro, Brazil.

♦ Herbert N. Frogner was appointed principal of the Greasel Intermediate School, Detroit, Mich.

Mr. Frogner completed work at Stout and the University of Detroit from which he holds a master of arts degree. Prior teaching service includes Wesleyan University, Middletown, Conn., and Muhlenburg College, Allentown, Pa.

♦ Robert B. Gilbertson has been appointed manager of the High Point, N. C., branch of the Yates-American Machine Co., Beloit, Wis. Mr. Gilbertson will supervise all sales and service for the woodworking machinery division in the southeast.

(Continued on page 27A)

The Artist

Gordon Brusstor of San Francisco. Mr. Brusstor's illustrations appear in leading magazines.

The Illustration

From "Westways," a scene of an old California ball in Monterey. The artist's pen captures the charm and vitality of the dance where "Costumes were borrowed, most were improvised. They ranged from plain robes to satins, from patent leather to square-toed brogans."

The Medium

Higgins American India Ink, of course. The even, free flow of the ink, the controlled surface tension, help Gordon Brusstor achieve the natural cadence of the dancing figures.

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thus assuring you STREAMLINED SERVICE from the moment your order reaches BRODHEAD-GARRETT until shipment is made

TO MEET adequately the increased demands from schools throughout America and many foreign countries for equipment, machinery and supplies, BRODHEAD-GARRETT has inaugurated the most modern order service "production line" ever known in the school field.

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In a word, it puts "production line" efficiency into the filling of every school order whether for just a few or hundreds of the more than 12,000 items B-G catalogs — and at a substantial saving of time, and money for B-G customers.

For today's best service on your orders for school equipment, machines and supplies, use the NEW 1951 B-G Catalog — if you haven't yet received a copy, write for it. Save time, money, extra paper work by buying everything from "America's Headquarters for Industrial School Supplies."

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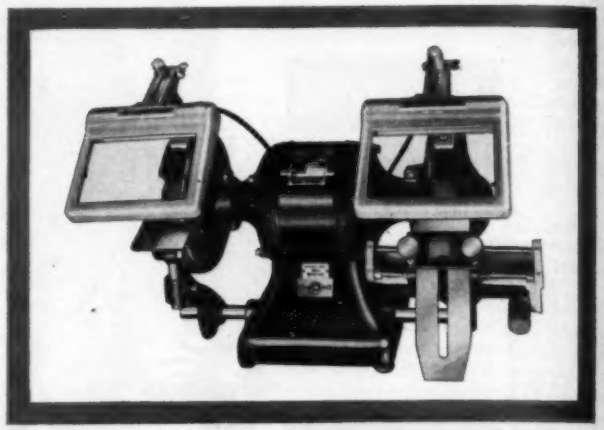

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City & State.....
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PERSONAL NEWS

(Continued from page 24A)

♦ CHESTER A. ARENTS has been named coordinator of research at Illinois Institute of Technology, Chicago, Ill.

Mr. Arents has been assistant dean of engineering. He joined the Illinois Tech staff in 1947 as associate professor of mechanical engineering, and was named assistant dean in September, 1949.

In his new capacity, he will handle all matters relating to sponsored research within the Institute, including proposals, contracts, staff, reports, and administration.

♦ WILLIAM A. SELLON received the Ed.D. degree in industrial education at Bradley University, Peoria, Ill., in June, 1950, and has continued on as a member of the staff at Bennett College, Bradley University. His dissertation was "A Study of Methods of Evaluation and Their Application to Industrial Arts With Suggestions for the Content of a Course in Techniques of Evaluation."

♦ NORMAN C. PENDERED, supervisor of industrial-arts student teaching at the Millersville State Teachers College, Millersville, Pa., received his doctor's degree in industrial-arts education at the Pennsylvania State College on January 27, 1951. During the past summer he served as visiting instructor in the Department of Industrial Education at the Pennsylvania State College.

♦ H. H. Burlingham, teacher trainer at California State Polytechnic College, San Luis Obispo, Calif., reports that most of the 17 students, now in their fifth year at California Polytechnic, will be entitled to receive secondary teaching credentials after successfully completing five months of practice teaching in the field.

Following is a list of cadet teachers giving home towns and training centers: Howard S. Ferguson, Holtville, and William J. Spragge, San Luis Obispo, Arroyo Grande High School; Raymond P. Bircher, Anaheim, and Donald Carothers, Montebello, Atascadero High School; Raymond L. Spooner, El Monte, and Ronald E. Squires, Tustin, Fullerton High School; Richard C. Calhoun, Covina, and Richard G. York, Glendale, Hemet High School; Frank W. Fox, Jr., Tujunga, and Dixie G. Mitchell, Live Oak, Madera High School; Frank W. Lawhorn, Visalia, and Charles F. Wood, Ontario High School; Maurice A. Balaam, Jr., Lompoc, and George J. Olney, Cleveland Heights, Ohio, San Luis Obispo High School; Robert L. Bristow, Reedley, and Frank G. Coyes, Santa Barbara, Santa Maria High School; Paul MacCormack, Los Angeles, Van Nuys High School.

Completing requirements this month for job placement, according to Burlingham, are: Albert L. Carter, Wasco; Carter T. Walker, Arroyo Grande; Thomas C. Cunningham, San Luis Obispo; Kermit H. Adams, Porterville; Howard A. Marshburn, Whittier; and Harry C. Mellon, Inglewood.

♦ HAROLD E. DOUMA has been appointed instructor of industrial arts at the South Side Junior High School, in Wayne, Mich.

♦ W. BERRY of Fond du Lac, Wis., has assumed his new duties as director of the Tomahawk School of Vocational and Adult Education, Tomahawk, Wis.

♦ Three new supervisors were appointed in the Bureau of Occupational Extension and Industrial Services, State Education Department, Albany, N. Y.

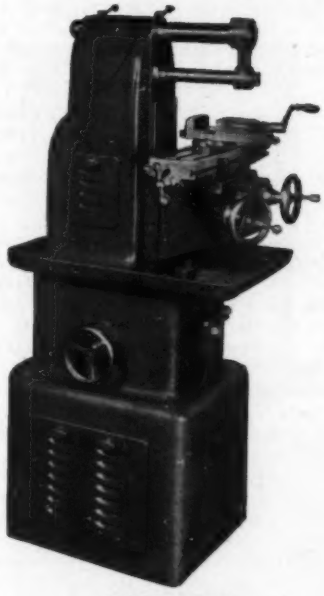
EDWIN BLANCHARD BROWN, a newcomer, is provisionally appointed as associate supervisor assigned to the development of the Vocational Arts and Crafts program.

R. GUY FOSTER, for several years with the department, and GERALD E. OTTOSON, with the department the past year, have received permanent appointments as associate supervisors, apprentice training.

♦ JOHN WEBB JONES was granted a graduate assistantship recently at Louisiana State University in Baton Rouge, where he is also working toward his Ph.D. degree.

♦ JOHN F. SINON, director of apprentice training, Albany, N. Y., has planned an in-service teacher training class as a part of his fall program.

You really need a precision milling machine for a complete course in shop practice



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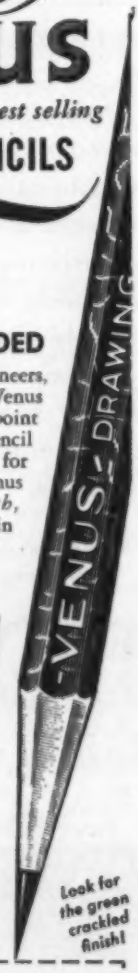

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City.....*State*.....

News Notes

♦ Saturday morning classes for night-shift aircraft workers have been opened at the Kenwood High School Evening Adult Education Center, Towson, Md.

The 9 to 12 Saturday morning classes are in addition to the regular two-hour sessions Tuesday and Thursday evenings and mark the first such daytime classes to be organized since World War II.

In co-operation with officials of the Glenn L. Martin Company, county school authorities organized the daytime courses to assist in the training of experienced production workers required by stepped-up defense activity at the Martin Company.

Employment at Martin's is currently reported to be over 12,000 — a rise of some 5000 during the past year. There are prospects that several thousand new workers will be added within the next few months.

While the demand for industrial subjects such as drafting, electronics, blueprint reading, civil aeronautics, and machine shop, continues to be heavy there is also a rising demand for business subjects such as typing, shorthand, and business machine practice.

Local industries have been helpful in supplying teaching aids, and in some cases, instructors, for the highly specialized technical subjects offered at the Kenwood Evening Adult Education Center.

Registrants at the school are employees of Glenn L. Martin Co., Bethlehem Steel, Crown Cork and Seal, Edgewood Arsenal, and the Baltimore Signal Depot.

♦ *The Story of Duco Finishes* is designed to provide a pictorial record of the history of "Duco" and the impact it has had on the American scene.

It contains much interesting and historical information on the changes that have taken place in finishing practices since the birth of Duco lacquer in 1920.

♦ Interior partitions which include provisions for storage are to be studied by the Small Homes Council of the University of Illinois under a new research grant from the Lumber Dealers Research Council.

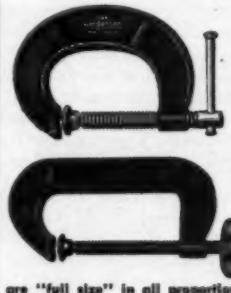
The purpose of the study, which will cover a 12-months' period, is to prepare recommendations for construction of closet walls which can be adapted to any price-class house. They will be designed both for new homes and remodeling. They will be modular in dimension (divisible by 4 in. or multiples of 4 in.), and will be flexible in construction and in choice of materials.

Results of the studies, together with photographs and detailed working drawings, will be published by the Small Homes Council for the benefit of the nation's homes.

♦ Northeastern State College, Tahlequah, Okla., will launch a crafts program for adult Indians and others in the space recently vacated by the machine woodwork shop.

This program is an effort to supplement the fine work done in this area among the Indians to revive the older crafts among the adults as well as the work with the Indian youth of the Sequoyah Indian Training School. This work has been promoted by Bill Ames of the Indian Service and through an association known as the Sequoyah Indian Weavers. The Indian Service

SPECIFY AND INSIST UPON GENUINE "Jorgensen" TRADE MARK REG U S PAT OFF "C" CLAMPS



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Where price is the prime consideration, Style #1 "JORGENSEN" Carriage Clamps will be found to be the choice of careful buyers. Very low in cost — yet they are "full size" in all proportions, and will give long, satisfactory service.

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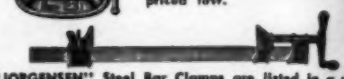

"JORGENSEN" Steel Bar Clamps are listed in a wide range of styles and sizes, for every purpose. Fastest operating, and most economical because of the long service they give.

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"C" Clamps, Handscrews, Steel Bar Clamps, Clamp Fixtures, Press Screws, Lathe Dogs, etc., are available through your favorite tool supplier — cost no more than ordinary clamps!

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Here's a unique series of work problems which gives a practical basis for doing all the operations possible in the average school shop and encourages the student to become proficient in the techniques of printing. 95 work sheets provide enough material for 2½ to 3 year course ... each gives average time; purpose of lesson; clear, complete instructions; and questions and problems to teach the student to read with comprehension and to express himself clearly and concisely. *By Merle A. Clark, Instructor of Printing, Akron Public Schools.* — $2.68

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CHAS. A. BENNETT CO., Inc.
For 50 Years The Manual Arts Press
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and the Northeastern State College will cooperate in this work.

♦ An air-age institute will be held from June 18 to July 6. This three-week institute will give teachers interested in this subject an opportunity to find out what is being done — what can be done — and what should be done to make their students aware of the era in which we live.

For further information address Parks College of Aeronautical Technology, East St. Louis, Ill.

♦ The U. S. Civil Service Commission has announced that there is still an urgent need for elementary teachers in the Indian Service. The Commission announced an examination for elementary teachers in June, 1950, but to date sufficient qualified candidates have not been recruited.

The jobs being filled from the Commission's examination pay $3,100 a year. Applicants will not be required to take a written examination.

More detailed information about requirements and other points of interest are given in the examination announcement. The announcement should also be consulted for instructions on where to file application forms. Information and applications may be obtained from most first- and second-class post offices, from Civil Service regional offices, or from the U. S. Civil Service Commission, Washington 25, D. C. Applications will be accepted until further notice.

♦ Lan-O-Kleen is a free-flowing, nondusting powdered cleaner made by the West Disinfecting Co., Long Island City, N. Y. This hand cleanser now incorporates the soap intensifying emollient, lecithin.

In warm or cold water, it acts to remove the most stubborn types of industrial soils. It contains no irritating caustics or gritty abrasives. Cleansing is accomplished by the sponge-like action of fine-grain cornmeal particles, which also act as the carrier for the emollients.

For additional information, free demonstration, samples, write *West Disinfecting Co., 42-16 West St., Long Island City 1, N. Y.*

♦ A total of 753,944 persons received vocational training in the public schools of California last year according to reports of the office of the State Director of Vocational Education. Of this number, 453,944 students were enrolled in classes that qualified for federal-state reimbursement and 300,000 were enrolled in courses which did not so qualify.

♦ During the year 1949–50, 83,306 persons, including 26,515 apprentices, were enrolled in trade classes in California public schools, according to reports from local school districts compiled by the bureau of Trade and Industrial Education. The majority of these classes were in the building trades, such as carpentry and plumbing, and in metal trades, such as machine shop and automobile mechanics.

♦ The Air Reduction Sales Co., a division of Air Reduction Co. Inc., 60 East 42nd St., New York 17, N. Y., has announced the completion of a Kodachrome, sound motion picture which tells the story of new Aircomatic Process for welding aluminum, stainless steel, bronzes, and Monel.

This film explains the nature, character, and uses of the Aircomatic Process by closeup photographs made by using special filters and camera techniques. Showing time for this 16mm. two-reel, Kodachrome, sound motion picture is 21 minutes.

For further details, and to make arrangements for showing this film, please communicate with your nearest Airco office or write to *Air Reduction, 60 East 42nd St., New York 17, N. Y.*

(Continued on next page)

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Speed . . . 2 to 4 times faster. Blade speeds up to 4,400 f.p.m. at 1200 r.p.m. Vibrationless. Single and 8-speed models.

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NEWS NOTES

(Continued from previous page)

♦ A belief that professors in engineering schools should spend a year in industry was voiced here today by Granville M. Read, chief engineer of E. I. du Pont de Nemours and Co., Wilmington 98, Del., and he made a concrete offer to provide places for some of them.

Mr. Read urged educators to "come and work with us in industry" as he spoke to the Second Industry-College Conference of the Case Institute of Technology on "Industry's Need for Engineers and Scientists."

Offering to take into the Du Pont Engineering Department several professors from engineering schools, he proposed "giving them 12 months' experience throughout our entire engineering organization. We will pay them their regular salaries plus reasonable expenses."

♦ The President has signed a law extending Public Law 16 rehabilitation training to many veterans disabled since fighting started in Korea.

Previously, the training had been limited to disabled World War II veterans who saw military service between September 16, 1940, and July 25, 1947. Those injured in service after the 1947 date were not eligible for the training, even though their wounds and disabilities occurred in action in Korea.

Under the new law, veterans disabled while on active duty on or after June 27, 1950, may be entitled to Public Law 16 education and training.

Veterans eligible for Public Law 16 training under the new law should make application at their nearest V-A office.

♦ In order to provide American Industry with more concise technical information and insight into the newer process of welding with non-fusion filler metals, Eutectic Welding Alloys Corporation, New York, N. Y., is compiling a new series of manuals on this subject. Profusely illustrated, clearly and yet not too technically written by some of the top men in the industry, these manuals belong on the open shelf of any company, school, or public library proud of its up-to-date technical reference section.

The "Manual of Welding Engineering and Design" is the first of the series to come off the press, and is now available *free of charge* from the Technical Information Service of the company. Forty-four pages of scientific data, interspersed with drawings and charts for added clarity, make this manual profitable reading for anyone engaged in the art of joining metals.

Copies of these manuals are available free of charge to all teachers and librarians. Requests for single copies should be addressed to the Technical Information Section, Eutectic Welding Alloys Corporation, 40 Worth Street, New York 13, N. Y. Where larger numbers of these manuals are required for the purpose of using them as texts in industrial arts or vocational courses, such requests should be addressed to *Mr. R. D. Wasserman, President, Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y.*

New Publications

Cabochon Jewelry Making

By Arthur and Lucille Sanger. Cloth, 128 pp., 6 by 8¾ in., illus., $3.50. Chas. A Bennett Co., Inc., Peoria 3, Ill.

A book that will delight the student of jewelry making and the hobbyists who are interested in designing and making their own jewelry.

It describes clearly how to make bezels, jump rings and coils, and how to clean, polish, solder, and set stones.

The book also has a chapter on cabochons mounted without bezels.

More than 100 fine articles such as necklaces, bracelets, pendants, rings, brooches, earrings, pins, and the like, are described. All of the descriptions are accompanied by excellent illustrations.

Ingenious Mechanisms

Edited by Holbrook L. Horton. Cloth, 536 pp., 6⅛ by 9¼ in., illus., $6. The Industrial Press, 148 Lafayette St., New York, N. Y.

An encyclopedic volume on mechanical movements. This is Volume III of this book and it will be especially useful to industrial designers in the mechanical fields. The descriptive material is clear and fairly concise while the excellent line cuts can be easily read by anyone who knows how to use working drawings.

The subjects covered are cams, intermittent motion, trip and stop mechanisms, relief mechanisms and safeguards, interlocking devices, reversing mechanisms, reciprocating motions, quick return motions, speed changes, differentials, overrunning clutches, self-centering mechanisms, special lever combinations, feeding and ejecting devices, valve diagrams, and the like.

(Continued on page 32A)

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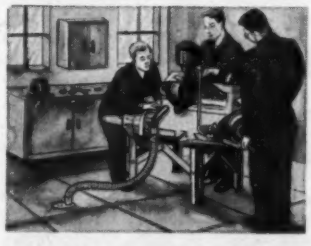

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NEW PUBLICATIONS

(Continued from page 30A)

Projects in General Metalwork

By M. J. Ruley. Cloth bound, 6⅛ by 9¼ in., $2. McKnight & McKnight Publishing Company, Bloomington, Ill.

A fine collection of metalworking projects for the industrial-arts students.

There are 35 of these projects presented in the book. Each is illustrated in regular blueprint form, and each is accompanied by an instruction sheet.

Most of the articles that the student will make have definite value in the home, while some are designed for garden use, or for the toolbox in the home shop.

Counseling Adolescents

By Shirley A. Hamrin and Blanche B. Paulson. Cloth, 371 pp., 6 by 8½ in., $3.50. Science Research Associates, Inc., Chicago 4, Ill.

This book describes the techniques that should be employed for counseling young people, and gives examples of how to apply the techniques in actual counseling situations.

The ten chapters discuss human nature and counseling, the adolescent period of life, philosophies of counseling, eclectic counseling, interviews and examples of counseling interviews, counseling in educational areas, counseling in vocational areas, counseling in emotional areas, and an analysis of what a competent counselor needs.

Occupational Guidance

By Paul W. Chapman. Cloth, 635 pp., 5¾ by 7⅞ in., illus., $3.30. Turner E. Smith & Co., Atlanta 3, Ga.

A book for boys and girls who wish to choose their careers.

It is divided into five parts which explain how to plan one's career, how to make a study of various occupations, how to analyze and improve one's personality, how to prepare for the work one has chosen, and then how to find or create a job in the chosen field.

Handbook of Early American Decoration

By Edith Cramer. Cloth, 90 pp., 7⅞ by 10¾ in., illus., $3. Charles T. Branford Co., 551 Boylston St., Boston 16, Mass.

An interesting book giving full-page patterns for decorating trays, bellows, chairs, and chests. It also lists the supplies needed for painting and stenciling and the like.

The book shows numerous half tones of these decorations, besides giving directions on the mixing of paints, doing gold leaf painting and glass and mirror painting.

Automotive Engines

By William H. Crouse. Paper, 180 pp., 8¼ by 11 in., $1.60. McGraw-Hill Book Co., New York 18, N. Y.

This is a workbook which is a combination shop guide, study guide, notebook, and work-progress report.

It contains directions for performing 55 jobs having to do with the automobile engine.

Each job sheet is accompanied by a number of test questions which the student must answer as a part of the job assigned to him.

General Mathematics for the Shop

By Gilbert D. Nelson, Frank C. Moore, Carl Hamburger, and Philip Becker. Cloth, 440 pp., 6¼ by 9⅜ in., illus., $2.64. Houghton Mifflin Co., Boston, Mass.

A fine practical book for the school shop which presents numerous excellent problems in arithmetic, algebra, and geometry.

The book also contains problems applied to figuring costs of shop projects, and to power and transmission, screw thread and taper, and building construction problems.

It also contains a number of very useful tables.

The Foreman's Place in Management

By T. G. Newton and Bleick von Bleicken. Cloth, 150 pp., 5¼ by 8½ in., illus., $2.50. National Foreman's Institute, Inc., Deep River, Conn.

One of the National Foreman's Institute Standard Management Practice Series.

The two sections of this book present in clear concise manner just what being a foreman means, and what characteristics a man must have or develop in order that he may be a good foreman.

The two sections of the book present the subject matter under the following seven chapter headings: professional foremanship, foreman-management problems, four basic steps in making the foreman part of management, three further steps, human relations is everybody's job, dollars-and-cents value of human relations, and management and labor.

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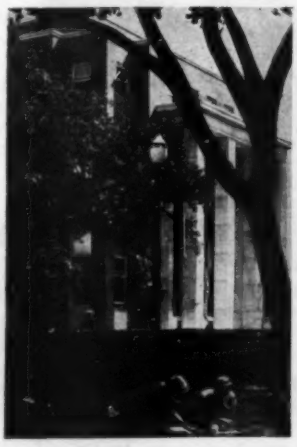

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SHOP EQUIPMENT NEWS

NEW GEAR BOX FOR SOUTH BEND LATHES

A new and simplified quick change gear mechanism can now be supplied on 16- and 14½-in. swing South Bend Lathes. Having a minimum number of parts and being fitted with ball and needle bearings, it requires less power and yet is very sturdy. A direct reading index chart shows positions in which the two conveniently located tumbler levers are placed for each of 48 screw thread pitches, 48 power longitudinal feeds, and 48 power cross feeds. There are no sliding clutches or sliding primary end gears to change. Shifting a single lever changes feed instantly from coarse to fine, for roughing or finishing cuts.

New South Bend quick change gear mechanism

Standard screw threads from 8 to 224 per inch are obtained simply by shifting the two tumbler levers on the gear box. The stud gear is changed for an additional series of coarse pitches ranging from 4 to 7 threads per inch. A special and intermediate gearing needed to cut metric screw threads, diametral pitch worm threads, or other special screw threads is provided. The regular gear guards are so constructed that they will enclose the metric or other gearing. No additional guards are needed.

For additional information and complete specifications of lathes equipped with this new quick change gear box, write to *South Bend Lathe Works, South Bend 22, Ind.*

For brief reference use IAVE—0401.

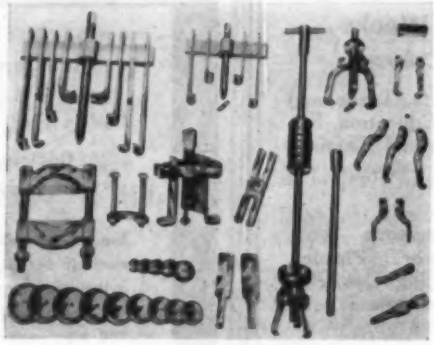
FOUR PROTO PULLER SETS ADDED

Development of a Proto master puller set and three smaller, high-utility puller sets has just been announced by the Plomb Tool Co., Los Angeles, Calif.

Master Set No. 4000AB was designed for all types of vehicle, equipment, and plant maintenance. It includes six basic pullers — heavy, medium, light, wheel, slide-hammer and bearing-separator types — and 28 supplementary parts. Hundreds of setups can be made from the set because the parts are interchangeable, thus eliminating the need for and cost of many special pullers.

Set No. 4010C is a heavy-duty type with regular and cap screw jaws. It is especially suited for pushing out shaft bearings, sleeves, and subassemblies.

Set No. 4020C has two cap screws and a slotted cross arm that permits a range of adjustments up to 6 in. It is useful for pulling harmonic balancer and pulley assemblies, timing gears, and many other parts.



Proto Master puller set 4000AB is very complete, useful, and versatile

Set No. 4056A is a slide-hammer type with a short rod and two long, narrow, high-strength jaws. It removes the clutch pilot bearings from flywheels and handles practically all bearings with a bore of ⅝ to 1¾ in.

For further information write to the *Plomb Tool Company, Los Angeles, Calif.*

For brief reference use IAVE—0402.

DELTA RADIAL-ARM SAW

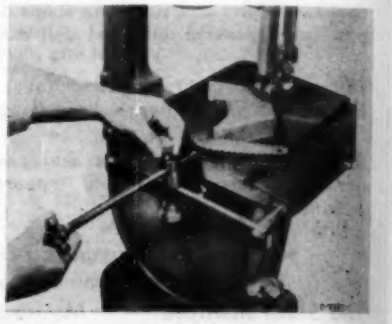
The new Delta radial-arm saw, model 40-B, has been announced by the Delta Power Tool Division, Rockwell Mfg. Co.

This saw is provided with Delta's double 360-deg. radial action, which permits the saw to be adjusted to the lumber instead of the lumber to the saw.

Delta radial-arm saw

This firm also has added a screw feed attachment for use with the Delta ¾-in. metal cutting band saw. This device is equipped with a finger tip feed screw release for quick adjustment, a star wheel to provide efficient feed, an adjustable jaw usable in many positions for handling irregular shaped work, a laterally adjustable pivot block. The entire screw assembly can be removed instantly to provide complete table clearance for handling larger work.

A complete instruction sheet comes with each unit showing how to cut rectangular pieces, curves, and irregular shapes.



Delta screw-feed attachment for ¼-in. metal cutting band saw

New features of the model 40-B include: automatic locating latches at 0, 30, 45, 60, and 90 deg.; totally enclosed Fiberglas-insulated direct drive motor; lifetime nitraloy trackways; pivot-point slide that keeps saw kerf above work top; safety guard that has splitter with kickback fingers.

This new Delta 40-B radial-arm saw is mounted on a stationary cabinet type base which in addition provides a good storage place for saw blades and other accessory items. This unit is available in several sizes — ½–5 h.p., single phase, a.c.; ¾–7½ h.p., three phase, a.c.

Further information on Delta's new model 40-B is available from Delta dealers or on request to *Delta Power Tool Division, Rockwell Mfg. Co., Milwaukee 1, Wis.*

For brief reference use IAVE—0403.

NEW CRAFTS CATALOG

A new catalog for vocational arts and crafts teachers has been announced by DonJer Products Company. Featured in the new catalog are craft kits and materials and new and unique finishes.

The craft kits have been selected in consultation with leading vocational experts as being ideally suited to school conditions. Each kit has been checked at teachers' conventions and only those finding wide acceptance by teachers have been listed.

In addition to the popular DonJer Suede-Tex flock finishing kit, the catalog lists metallic decals of 23kt. gold and silver, as well as both wrinkle and crystal finishes for wood or metals that do not require an oven but which may be baked under infra-red lamps.

The catalog will be mailed free to any teacher or school official requesting it. Write to *DonJer*

(Continued on page 36A)

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SHOP EQUIPMENT NEWS

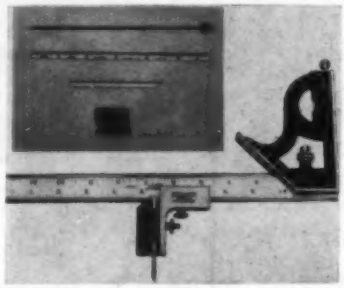
(Continued from page 34A)

Products Co., 1115 Sterling Pl., Brooklyn 13, N. Y.

For brief reference use IAVE—0404.

STARRETT ATTACHMENT FOR COMBINATION SQUARE

The wide utility of any 9-, 12-, 18-, or 24-in. Starrett combination square can be still further extended by means of a set of attachments developed by The L. S. Starrett Company, Athol, Mass. The new set, No. 289-C, consists of a



Showing clamp block and scriber mounted on a combination square by means of attachment 289. Insert shows the attachments now available as set No. 289-C

clamp block, scriber, 6-in. rule, and 6-in. rod which are used in conjunction with attachment No. 289 designed to secure a steel rule or steel square in 90-deg. relationship to the blade of a

(Continued on next page)

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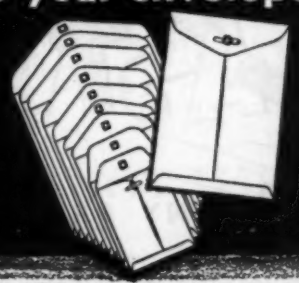

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SHOP EQUIPMENT NEWS

(Continued from previous page)

combination square. The clamp block furnished with Set No. 289-C provides a ready means of mounting the scriber, rod, or 6-in. rule. With the scriber inserted, a practical height gauge results which can be used to measure or mark off vertical distance from a plane surface, for locating center distances, scribing lines, etc. Use of the 6-in. rule converts the tool into a depth gauge for directly measuring depths of holes, slots, recesses, etc., in 64ths of an inch. With the rod, also used as a depth gauge, the depths of smaller recesses, steps in holes, etc., can be similarly checked.

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For brief reference use IAVE—0405.

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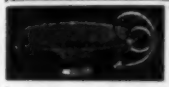

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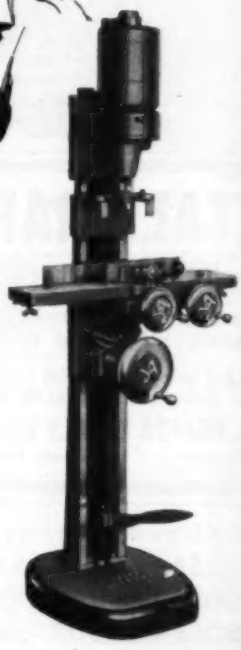

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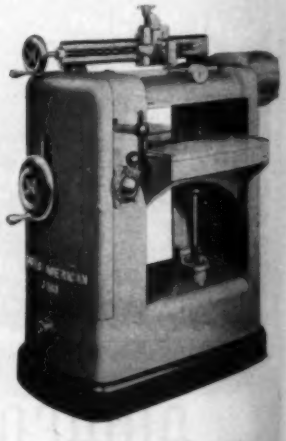

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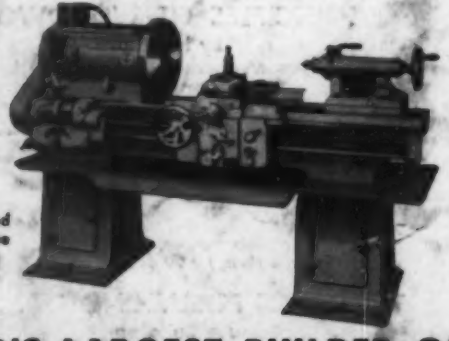

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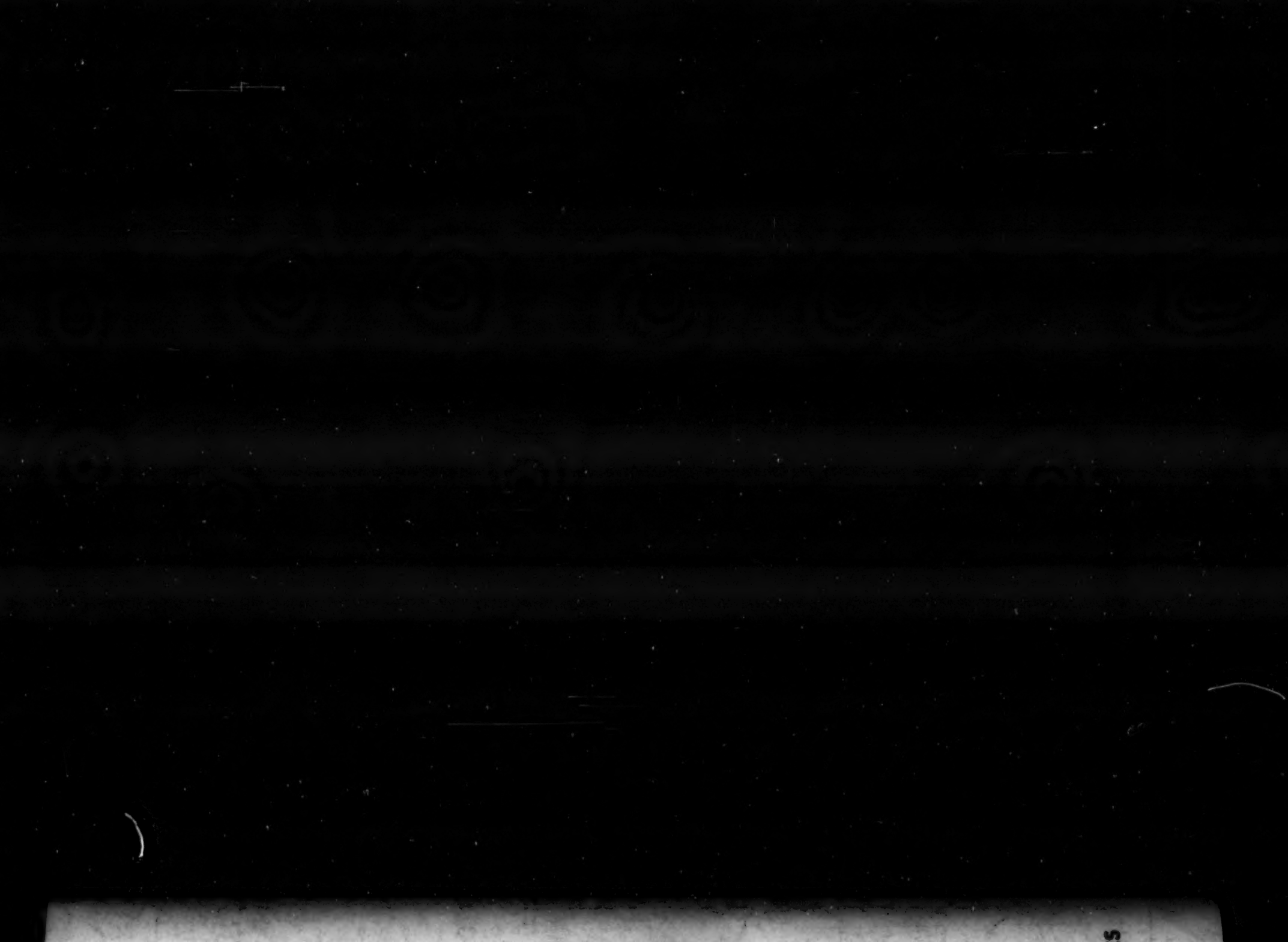
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